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NORTHERN

Utilization Research & Development Division

Publications and Patents

January - June 1969

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**Agricultural Research Service
United States Department of Agriculture**

CONTENTS

	Page
Introduction	3
Request for Information	3
Subject Index	4
Author Index	8
Publications	11
Republication	36
Contract and Grant Research Publications	37
Patents	43
Licensing of Patents	45

Northern Utilization Research and Development Division
Agricultural Research Service
United States Department of Agriculture
1815 North University
Peoria, Ill. 61604

INTRODUCTION

The Congress in 1938 authorized four regional laboratories, now known as Utilization Research and Development Divisions, to conduct basic and applied research designed to expand, improve, and develop through science and technology the utilization of American farm crops. The need and importance of such research arise because the farmer is not organized to carry on modern scientific research to maintain old markets for his products and to create new ones. Since their inauguration, these laboratories have contributed much basic knowledge of the chemical composition and physical properties of farm commodities and have applied this knowledge to create new or improved products and processing technology that have enhanced utilization of many farm commodities.

In 1969, the Southeastern Agricultural Research Laboratory, headquarters of the Southeastern Utilization Research and Development Division, was built to serve the specialized needs of that region.

The Northern Utilization Research and Development Division is responsible for research on industrial utilization of the cereal grains — corn, wheat, barley,

grain sorghum, and oats; and the oilseeds — soybeans and flaxseed. Except for wheat and barley, the research includes food and feed uses of these crops. In the Department's program of research on replacement crops, the Northern Division conducts all screening and characterization studies on uncultivated plants and their components. It is also responsible for more intensive research on new oilseeds containing erucic acid and on new gum and pulp fiber plants. In addition to its internal program of research, it carries out work through domestic contracts and grants and conducts related research abroad under grants or contracts involving Public Law 480 funds.

The research investigations at the Northern Division are supported by more than 450 people, about one-half of whom have professional status. This body of highly trained men and women with specialized knowledge in various disciplines are responsible for the scientific publications and patents listed here.

General information about these four Divisions is given inside the back cover.

REQUEST FOR INFORMATION

The results of the research of the Northern Utilization Research and Development Division are published regularly in the technical literature, and public-service patents are secured to cover patentable inventions and discoveries (see page 43). As a convenient guide to our publications and patents, a list with abstracts is published semi-annually. The abstracts describe the current research and indicate the progress achieved. Further information on any of the developments, as well as earlier technical papers, may be obtained by writing us.

In conformance with the policy of the Department of Agriculture, Northern Division publications are available to scientists and other specialists, librarians, representatives of the press, and others interested.

Requests for specific reprints should be by number

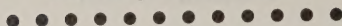
and addressed to the Northern Division. Those titles marked with an asterisk [*] are not available for distribution.

Most of the publications are in journals that are available in libraries. Photographic copies of most journal articles on research at this Division can be purchased from the National Agricultural Library of the U. S. Department of Agriculture, Washington, D. C. 20250.

No publications will be sent regularly in response to foreign requests unless exchange arrangements have been made with the Director of the National Agricultural Library.

Copies of previous lists of publications and patents are available upon request.

January - June 1969



SUBJECT INDEX FOR PUBLICATIONS AND PATENTS

[Compiled by reprint order number. Numbers marked (*) do not have reprints available for distribution.]

CEREAL GRAINS

General

Carbohydrate complexes of earth metals: 2465*
Carbohydrate polymers: 270-F
Dichloride salts of methylenated sugar acids: U.S. 3,420,852
Food materials, a viscoelastic technique: 43-G*
Fructose, automated determination in glucose: 2461
Glucofuranose, derivative of: 42-G*
Glucopyranose, sulfenyl bromide derivative: 46-G
Glucopyranosylsulfenyl bromide, derivative and reactions: 47-G
Methyl α -D-glucopyranoside, adduct of: 208-C*
 vinylation of: 204-C
Molecular weight determinations of polyelectrolytes: 2492*
Nucleophilic opening of oxetane rings: 41-G*
Phosphoric acid esters: 50-G*
Polyvalent cations, precipitation of: U.S. 3,433,738
Sulfur-containing compounds: 2489
Thiocarbonyl sugars, chlorine derivatives: 2523
Unsaturated sugars, reactions with: 39-G

Starch

Addition reactions: 44-G
Amylose, amination of: 40-G
 structure: 2514; 38-G*
Amylose films, structure: 2507
Anthranilates: 2484
Characterization in aqueous solution: 267-F
Copolymers as salt-resistant thickeners: U.S. 3,425,971
Copolymers, continuous production of: 2505
 dilution effect: 2503
 soluble: 2519
Enzymes, starch-degrading: 255-F
Magnetic resonance spectroscopy, analysis by: 263-F
Paper additives: U.S. 3,436,305
Polarographic techniques, determination of carbonyl groups: 260-F; 264-F; 265-F
Polyurethane foams: U.S. 3,433,752
Reinforced rubber: U.S. 3,442,832

Wheat

- Cationic cereal flours, preparation of: 2454
- Computer calculations, cereal-based food composition: 2471
- Flours for sizing linerboard: 201-C*
- Gluten, hydrazine modification: 2513
- Gluten proteins: 2455
- Sulfated flours: 2490

Corn, Sorghum, and Other Grains

- Amylose, structure: 2514
- Carotenoids in corn with different pigment concentrations: 2459
- Cationic cereal flours, preparation of: 2454
- Computer calculations, cereal-based food composition: 2471
- Corn, albumins and globulins in extracts: 2509
 - chemistry of kernel: 2456*
 - chromatographic analysis of oil: 2462
 - effect of moisture on: 45-G*
 - gelatinization of grits: 2451
- Endosperm protein: 2510
- Ochratoxin A, natural contaminant: 2506
- Sorghum, amino acid composition: 205-C*
 - current research: 2515*

Fermentative Conversion and Microbiology

- Actinomycete amylases: 35-G*
- Actinomycetes, taxonomy and nomenclature: 2487
- Aflatoxin B₁: 2516
- Aflatoxin B_{2a}, biological activity: 2499
- Aflatoxin-contaminated edibles, detoxification of: U.S. 3,428,458
- α -Amylases: 34-G*; 37-G*
- Amylases, *Thermoactinomyces vulgaris*: 36-F*
- Antibiotics, antiviral and antitumor: 266-F
 - production by *Alternaria*: 2476
- ARS Culture Collection: 2512*
- Aspergillus candidus*, D-mannitol metabolism: 2495
- Bacillus popilliae*, sporulation of: 2494
- Bacterial wall peptidoglycan: 262-F
- Enzymes, bacteriolytic: 257-F
- Eurotium*, new species of: 1242*
- Fermentation research, 1968 publication list: 2473
- Fungal spores, substrate conversion: 2479
 - sucrose inversion: 2485
- Hansenula*, homothallic taxa: 2529
 - speciation by hybridization: 2500*
- Japanese beetle, larvae: 2493
 - milky disease: 2448; 2494; 199-C; 200-C
- Lipids and aflatoxins, synthesis of: 2486

Mannitol, shortened process for: U.S. 3,427,224
 Mevalonic acid production: 258-F
 Mycotoxins: 2449*; 2524
 Ochratoxin A: 2453; 2506
Piptocephalis, species of: 256-F*
 Rennin-like proteinases: 2452
 Sterigmatocystin, biological activity of: 2450
 Yeast, keto acid formed: 2498

OILSEEDS

General

Azelaaldehydic esters, reactions of: 2478
 Fatty esters, countercurrent distribution: 2525
 hydroformylation: 2474
 Homogeneous hydrogenation: 209-C*; 212-C*
 Hydrogenation of fats: 2458
 Lysine in proteins: 48-G*
 Methyl azelaaldehydate and pelargonaldehyde, amine derivatives: 2466
 Microreactor system for gas chromatography: 2467
 Poly(ester acetals): 210-C
 Polyolefinic materials, isomerization and hydrogenation: 211-C*
 Radiochromatography, gas: 2483
 Safety device for laboratory heating: 2511
 Sunflower oil: 2491*

Linseed Oil

Concrete, preventive maintenance: 2469
 New coatings: 202-C*
 Unsaturated aldehyde synthesis: 2522

Soybean Oil

Fatty acids, double bond determination: 2521
 Hydrogenation, homogeneous: 2501
 selective heterogeneous: 2468; 2502
 Palladium-tin complexes: 213-C*
 Processing: 2477
 Tocopherol, dimeric oxidation product of: 268-F
 Unsaturated aldehyde synthesis: 2522

Soybean Meal and Protein

Cytochrome *c*, isolation and characterization: 254F
 Defatted flakes, lipids of: 2518
 Enzymes, proteolytic: 269-F
 Gastrointestinal gas: 49-G
 Nucleotides: 2517

Processing: 2477
 Protein nomenclature: 2472
 Soybeans as food, Oriental methods: 378
 Tocopherol, intracellular distribution: 261-F

Fermentative Conversion and Microbiology

Oriental fermented foods: 2475
 Soybeans as food, Oriental methods: 378

NEW CROPS

General

Cruciferae lipids: 259-F
 Gas chromatography, molecular characterization: 2497
 Mycotoxins, fescue toxicity: 2524
 New crops, 1968 publication list: 2463
 Polymer purification, apparatus for: 2464
 Proteinase of *Jarilla chocola*: 2526
 Rotenone and deguelin, determination of: 2457

Oilseeds

α -Hydroxylinolenic acid: 2460
Carlina seed, fatty acids: 2482
 —Crambe, diester plasticizer preparation: 2527
 seed meals biological evaluation: 2496
 Goitrins: 2528*
 Methyl esters, preparation of: 2481
 Nylons-13, -13/13, and -6/13: 2488
 Olefinic acids, determining unsaturation: 2480
 Thioglucosides: 2520
 Vinyl brassylates, copolymerization: 2504

Pulping Crops

Kenaf juice: 2508

January - June 1969

.....

AUTHOR INDEX FOR PUBLICATIONS AND PATENTS

A

Abdullah, M.: 34-G*
 Adams, R. W.: 209-C*; 212-C*
 Adkins, G. K.: 267-F
 Albano, E. L.: 44-G
 Amano, S.: 260-F
 Anders, D. E.: 2466
 Anderson, R. A.: 2451; 2515*
 Ando, K.: 258-F; 266-F
 Appelqvist, L. A.: 259-F
 Arai, S.: 269-F
 Arima, K.: 258-F; 266-F
 Austin, G. T.: 201-C*

B

Babcock, G. E.: 2492*, 2519
 Bagby, M. O.: 2508
 Baijal, U.: 256-F*
 Bailar, J. C., Jr: 209-C*; 211-C*; 212-C*;
 213-C*
 Banks, W.: 255-F; 267-F
 Batley, G. E.: 209-C*; 212-C*; 213-C*
 Beal, R. E.: 2521
 Beckwith, A. C.: 2455
 Bell, R. H.: 46-G; 47-G
 Benjamin, C. R.: 1242*
 Berry, J. W.: 204-C; 208-C*
 Bitner, E. D.: 2467
 Black, L. T.: 2462; 2521
 Black, S. H.: 100-C; 200-C
 Black, W. A. P.: U.S. 3,420,852; U.S. 3,433,738
 Blessin, C. W.: 2456*; 2459
 Booth, A. N.: 2496
 Brekke, O. L.: 2462
 Buchanan, R. A.: U.S. 3,442,832
 Bumb, R. R.: 38-G*
 Burr, R. C.: 2503; 2519
 Butterfield, R. O.: 2525

C

Cadmus, M. C.: 2461; 2508; U.S. 3,427,224
 Campbell, J.: 205-C*

Casu, B.: 263-F
 Cavins, J. F.: 2471
 Chakrabarti, S.: 270-F
 Chang, S. P.: 2504
 Chatterjee, A. K.: 40-G
 Christianson, C. M.: 1242*
 Ciegler, A.: 2449*; 2450; 2476; 2479; 2485;
 2499; U. S. 3,428,458
 Clark, C. F.: 2505
 Comas, M.: 2505
 Conway, H. F.: 2451
 Cowan, J. C.: 2466; 2469; 2478

D

Dan-ura, K.: 264-F
 Davison, V. L.: 2467
 Daxenbichler, M. E.: 2496; 2520
 De, K. K.: 40-G
 DeJarlais, W. J.: 2511
 Delfel, N. E.: 2457
 Detroy, R. W.: 2486; 2516
 Deutschman, A. J., Jr.: 204-C; 208-C*
 Dewar, E. T.: U.S. 3,420,852; U.S. 3,433,738
 Deyoe, C. W.: 205-C*
 Dimler, R. J.: 2477
 Dintzis, F. R.: 2514
 Doane, W. M.: 2523
 Dutton, H. J.: 2458, 2467; 2468; 2483; 2502

E

Earle, F. R.: 2480; 2481; 2482
 Ellis, J. J.: 2512*; 2524
 Erlander, S. R.: 2492*
 Evans, C. D.: 2491*

F

Fanta, G. F.: 2503; 2519
 Frankel, E. N.: 2474, 2501
 French, D.: 34-G*; 37-G*
 Fridman, C.: 254-F
 Friedman, M.: 2489
 Fujimaki, M.: 269-F

G

Gagne, W. E.: 2496
 Gallo, G. G.: 263-F
 Gast, L. E.: 2469
 Gentry, H. S.: 2526
 Ghuysen, J. M.: 257-F; 262-F
 Gotoh, Y.: 260-F
 Goulden, M. L.: 2453; 2506
 Greenwood, C. T.: 255-F; 267-F
 Griffin, E. L., Jr.: 2451
 Grogan, C. O.: 2459
 Gugliemelli, L. A.: U.S. 3,425,971
 Gupta, K. C.: 40-G

H

Harada, I.: 261-F; 268-F
 Hartman, P. A.: 35-G*; 36-G*
 Haynes, W. C.: 2494; 2512*
 Hesseltine, C. W.: 2452; 2453; 2475; 2486;
 2506; 2512*; 2516
 Hoffmann, R. L.: 2518
 Holzapfel, M. M.: 2454; 2490
 Honig, D. H.: 2518
 Horton, D.: 39-G; 44-G; 46-G; 47-G
 Hosogaki, R.: 260-F

I

Imaoka, Y.: 265-F
 Inglett, G. E.: 2471
 Itatani, H.: 211-C*

J

Jackobs, J. J.: 38-G*
 Johnson, D. E.: 2479; 2485

K

Kaiser, E. T.: 50-G*
 Kakade, M. L.: 48-G*
 Kamatani, N.: 265-F
 Katchalski, E.: 254-F
 Khoo, U.: 2510
 Kinoshita, T.: 40-G
 Kleiman, R.: 2480; 2481; 2482
 Kodama, K.: 258-F
 Komoda, M.: 261-F; 268-F
 Koritala, S.: 2468; 2502
 Krull, L. H.: 2513
 Kubie, W. L.: 2469
 Kudo, K.: 50-G*

Kuehl, R. O.: 204-C
 Kuo, M. J.: 35-G*; 36-G*
 Kwolek, W. F.: 2471; 2493

L

Lauterbach, H. H.: 44-G
 Lenz, R. W.: 210-C
 Liener, I. E.: 48-G*
 Lillehoj, E. B.: 2449*; 2450; 2499; U. S. 3,428,458
 Lindenfesler, L. A.: 2476
 Lis, H.: 254-F
 Little, F. L.: 2501
 Luttenegger, T. J.: 41-G*
 Lyons, A. J., Jr.: 2487

M

MacGregor, A. W.: 267-F
 Maher, G. G.: U.S. 3,436,305
 Marvel, J. T.: 204-C; 208-C*
 Matsushita, S.: 261-F
 Mayall, B. I.: 208-C*
 Mehlretter, C. L.: 2484; U.S. 3,433,752
 Mehrotra, B. S.: 256-F*
 Metlin, S.: 2474
 Miller, M. J.: 47-G
 Miwa, T. K.: 2464; 2497; 2504
 Mohsenin, N. N.: 43-G*; 45-G*
 Morrow, C. T.: 43-G*

N

Nayak, U. G.: 42-G*
 Nelson, G. E. N.: 2485
 Nieschlag, H. J.: 2527
 Nishio, T.: 264-F; 265-F

O

Ono, S.: 260-F; 264-F; 265-F
 Otey, F. H.: U.S. 3,433,752

P

Papavizas, G. C.: 1242*
 Parrish, D. B.: 205-C*
 Paulis, J. W.: 2509
 Perkins, R. B.: 2488
 Pfeifer, V. F.: 2451

Popescu, O.: 2468
 Pridham, T. G.: 2487
 Pryde, E. H.: 2466; 2478
 Purvinas, R. M.: 2507

R

Rackis, J. J.: 2518
 Rakoff, H.: 2522
 Ramalingam, K. V.: 270-F
 Rankin, J. C.: 2454
 Reggiani, M.: 263-F
 Rendleman, J. A., Jr.: 2465*
 Reyes, Z.: 2505
 Rheineck, A. E.: 202-C*
 Rhodes, L. J.: 2494
 Rhodes, R. A.: 2448
 Rist, C. E.: 2454; 2490; 2503; 2505; 2523
 Robbins, D. J.: 2496
 Robyt, J. F.: 34-G*; 37-G*
 Roden, J. J.: 2488
 Rogovin, S. P.: U.S. 3,427,224
 Rohwedder, W. K.: 2474
 Rowell, R. M.: 41-G*
 Russell, C. R.: 2454; 2490; 2503; 2505; 2523;
 U. S. 3,425,971; U. S. 3,442,832
 Rutherford, D.: U.S. 3,420,852; U.S. 3,433,738
 Ruttle, D. I.: 2452

S

St. Julian, G.: 2493
 Sampath, P. R.: 202-C*
 Seckinger, H. L.: 2510
 Sessa, D. J.: 2518
 Sharon, N.: 254-F
 Shasha, B. S.: 2523
 Shaw, R.: 2491*
 Shotwell, O. L.: 2453; 2506
 Shelef, L.: 45-G*
 Shoup, F. K.: 205-C*
 Smiley, K. L.: U.S. 3,427,224
 Smith, A. K.: 378
 Smith, C. R.: 2460
 Smith, H. E.: 2490
 Spencer, G. F.: 2480; 2481; 2482
 Spyres, G. G.: 2462
 Srivastava, H. C.: 270-F
 Steggerda, F. R.: 49-G
 Stodola, F. H.: 2498
 Strandberg, G. W.: 2461; 2495
 Sullivan, J. E.: 201-C*
 Suzuki, S.: 266-F

T

Takagi, M.: 260-F; 264-F; 265-F
 Takahashi, K.: 264-F
 Tallent, W. H.: 2457; 2504; 2524; 2527
 Tamura, G.: 258-F; 266-F
 Tanquary, A. C.: 2488
 Tayim, H.: 211-C*
 Thomas, P. J.: 2483
 Tindall, C. G., Jr.: 39-G
 Tobin, R.: 2514
 Tookey, H. L.: 2524; 2526

V

VanEtten, C. H.: 2496; 2520; 2528*
 Vesonder, R. F.: 2498
 Vigevani, A.: 263-F

W

Wall, J. S.: 2455; 2471; 2509; 2513
 Wang, H. L.: 2452; 2475
 Wang, L. C.: 2517
 Wang, P. Y.: 40-G
 Weaver, M. O.: U.S. 3,425,971
 Weiner, B. A.: 2493
 Weislogel, O. E.: U.S. 3,442,832
 Wender, I.: 2474
 Whistler, R. L.: 41-G*; 42-G*
 Wickerham, L. J.: 2500*; 2512*; 2529
 Wolf, M. J.: 2510
 Wolf, W. J.: 2472
 Wolff, I. A.: 2460; 2480; 2482; 2488; 2496;
 2508; 2520; 2524; 2527
 Wolfrom, M. L.: 40-G
 Wu, Y. V.: 2515*

Y

Yamashita, M.: 269-F
 Yates, S. G.: 2524

Z

Zagoren, B. L.: U.S. 3,433,752
 Zaslow, B.: 38-G*
 Zobel, H. F.: 2507

January - June 1969

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PUBLICATIONS

[Publications marked with an asterisk (*) are not available for distribution. When requesting reprints, please order by number.]

- 1242*** • **A New Halophilic Species of *Eurotium***
 C. M. CHRISTIANSEN,¹ G. C. PAPAVIZAS,² and C. R. BENJAMIN
 (¹University of Minnesota, St. Paul; ²USDA Crops Research Division,
 Beltsville, Md.)
Mycologia 51(5): 636-640. September-October 1959

Eurotium halophilicum is clearly related to the other members of the genus by the morphology of both its ascocarpic and conidial states. It resembles the other species in its type of ascocarpic initials, its pseudo-parenchymatous cleistothecial wall, its asci which apparently result from crozier formation, and its ascospore shape and ornamentation. Also like other species, its conidial apparatus is of the *Aspergillus* type. It differs from other species in that its cleistothecial wall and sterile mycelium lack the bright yellow and orange pigments generally considered characteristic, its ascospore size is intermediate to the so-called "small-spored" and

"large-spored" groups, it requires very high concentrations of sugar or salt for growth, and its conidial state, *Aspergillus halophilicus*, is more nearly typical of the *A. restrictus* series of Thom and Raper than of any other series even though none of the members of this series has heretofore been reported with a perfect stage and none of the approximately 30 different isolates that we have cultured from grain and other materials has ever produced perithecia. Certainly in its adaptation to a high osmotic pressure, both in its natural habitat and in culture, *E. halophilicum* closely resembles some of the members of the *A. restrictus* series.

- 2448** • **Milky Disease of the Japanese Beetle**
 R. A. RHODES
 Proc. Joint U.S.-Japan Seminar on Microbial Control of Insect Pests, Kyushu
 University, Fukuoka, Japan, April 21-23, 1967, pp. 85-92. 1968

Large numbers of spores must be supplied in soil to achieve effective control of the Japanese beetle by infection with the milky disease bacterium, *Bacillus popilliae*. These spores have a complex structure characterized by an elaborate laminated spore coat. Although it is possible to grow large numbers of infective vegetative cells in the laboratory, such cells do not sporulate. Study of the disease process in the insect has provided the basis for evaluating the extent and characteristics of the sporulation by the pathogen. It appears that organized development beyond the primordial spore stage is blocked in artificial cultures. However, authentic spores are formed under specific conditions. As many as 20% of cells of selected strains sporulate

in colonies and spores in much lower numbers are formed by many strains in liquid media containing particulate carbon. Refractile structures without the characteristics of spores often are formed in large numbers under a variety of conditions. Although they possess some of the enzymatic and compositional characteristics of spores, they now are considered to be the result of disorganized sporogenesis. The occurrence of spores and refractile bodies in many cultures is indicative of the inherent sporogenic ability of the bacterium. It is hoped to obtain better sporulation of existent strains and to select other strains that possess greater capacity to sporulate in artificial culture.

- 2449*** • **Mycotoxins**
ALEX CIEGLER and EIVIND B. LILLEHOJ
Advan. Appl. Microbiol. 10: 155-219. 1968

The literature on mycotoxins is reviewed, with particular emphasis being given to aflatoxin. The chemistry, biochemistry, microbiology, analyses, safety procedures, control, and detoxification of this toxin are summarized. Other mycotoxins covered

are alimentary toxic aleukia, ochratoxin, sporidesmin, zearalenone, pink rot dermatitis, slaframine, yellow rice toxins, stachybotryotoxins, and rubratoxins.

- 2450** • **Biological Activity of Sterigmatocystin**
E. B. LILLEHOJ and A. CIEGLER
Mycopathol. Mycol. Appl. 35(3-4): 373-376. October 1968

The biological activity of sterigmatocystin towards mice, ducklings, and some microorganisms was determined. The LD₅₀ of sterigmatocystin for mice was in excess of 800 mg./kg. Aflatoxin B₁ was 125

times more toxic in the ducklings tests than was sterigmatocystin. The antibiotic disc assay demonstrated that 100 µg. of sterigmatocystin did not inhibit any of the microorganisms tested.

- 2451** • **Gelatinization of Corn Grits by Roll- and Extrusion-Cooking**
R. A. ANDERSON, H. F. CONWAY, V. F. PFEIFER, and E. L. GRIFFIN, JR.
Cereal Sci. Today 14(1): 4-7, 11-12. January 1969

Recent programs for worldwide feeding involve the production of a food blend, called CSM, which contains partially gelatinized corn meal in admixture with soy flour, nonfat dry milk, vitamins, and minerals. Partially gelatinized corn meal for use in CSM can be produced on heated rolls or by extrusion-cooking. In addition, the wide range of operating conditions available in either form of cooking

gives rise to a variety of products from corn meal, grits, or flour having applications in the food and industrial fields. Studies are described on the processing of corn grits by roll- and extrusion-cooking and on investigating such variables as moisture, temperature, and compression ratios, among others. Products are evaluated by their water absorption and solubility, consistency, and viscosity patterns.

- 2452** • **Milk-Clotting Activity of Proteinases Produced by *Rhizopus***
HWA L. WANG, DORIS I. RUTTLE, and C. W. HESSELTINE
Can. J. Microbiol. 15(1): 99-104. January 1969

Rhizopus oligosporus NRRL 3271 produces an enzyme having good milk-clotting activity. Yields of the enzyme were high in culture filtrates of milk, wheat flour, or wheat bran. The enzyme was stable at 40° C., or below, but its activity was destroyed rapidly by heating at 60° C. The enzyme was fairly stable between pH 3 and 6 and quite unstable at a pH below 2 or above 7. The enzyme was recovered from the culture filtrate by ammonium sulfate fractionation (30 to 75% unsaturation). When the enzyme was chromatographed on a diethylaminoethyl-cellulose column and eluted by salt gradient, four

active components were noted, two of which accounted for most of the activity. NRRL 3271 enzyme and animal rennin behave similarly toward the pH of milk, added calcium chloride, and sodium chloride. Although the NRRL 3271 enzyme caused a higher degree of proteolysis than did rennin, the proteolysis apparently was not high enough to interfere with curd formation. Therefore, the NRRL 3271 enzyme merits further study as a potential replacement for rennin or as an adjunct to be incorporated into rennin for the manufacture of cheese.

- 2453** • **Note on the Natural Occurrence of Ochratoxin A**
ODETTE L. SHOTWELL, C. W. HESSELTINE, and MARION L. GOULDEN
J. Ass. Offic. Anal. Chem. 52(1): 81-83. January 1969

Ochratoxin A has been detected as a natural contaminant for the first time. In a survey for the presence of mycotoxins one corn sample from commercial markets contained levels of ochratoxin A of 110 to 150 p.p.b. Identity of the metabolite as ochra-

toxin A was based on mobility on thin-layer plates in three solvent systems, solubility in 0.1 *M* sodium bicarbonate, formation of methyl ester with same mobility as ochratoxin methyl ester, and activity against *Bacillus megaterium*.

- 2454** • **Preparation and Properties of Cationic Cereal Flours**
J. C. RANKIN, MARGARET M. HOLZAPFEL, C. R. RUSSELL, and C. E. RIST
Tappi 52(1): 82-86. January 1969

Cationic flours were prepared by reacting ethylenimine with wheat, corn, and sorghum flours in the dry state by procedures similar to those reported previously for other modifications of flour. The flours were treated with 1 to 7 weight-percent ethylenimine under various conditions of time, temperature, pressure, and pH. The products were screened by a method used to determine cationic efficiency of cationic starches. Cationic flours having the best properties were those produced by treating flours at 60° C. with 2 to 3 weight-percent ethylenimine for 4 hours at atmospheric pressure and then acidifying. Values for cationic efficiency of both

cationic flours and commercial cationic starches were similar when tested in distilled water. When tested in hard water, however, values for the flours were higher. Overall paste viscosity properties of cationic flours were not greatly different from those of cationic starches. Paste dispersibility of cationic flours was considerably improved over the parent flours, but less than the commercial cationic starches. The cationic flours, when tested as internal sizing agents for paper in handsheets, gave retention and dry strength values comparable to the commercial cationic starches.

- 2455** • **Relationship Between Structure and Rheological Properties of Gluten Proteins**
JOSEPH S. WALL and A. C. BECKWITH
Cereal Sci. Today 14(1): 16-18, 20-21. January 1969

The rheological properties of concentrated solutions, gels, and films prepared from wheat gluten proteins have been correlated with their molecular structure. The manner in which the size, shape, and amino acid composition of the proteins influence hydrogen bonding and other associations between the protein molecules which are responsible for the viscoelastic quality of doughs was investigated.

The glutenin component of gluten protein was shown to be a large random coil molecule in contrast to gliadin which is smaller and more compact. These structural variations were found to be due to the different manner of formation of the protein disulfide bonds. Glutenin exhibited greater film strength and non-Newtonian viscosity than gliadin, indicating that its structure favors extensive molecular association.

- 2456*** • **A Review of the Chemistry of the Corn Kernel and the Effects of Artificial Drying**
C. W. BLESSIN
Proc. Corn Conditioning Conf., University of Illinois, Urbana, pp. 1-7. January 8-9, 1969

Physical and chemical composition of the corn kernel are reviewed, as well as the effects of arti-

ficial drying on viability, stress crack formation, and wet and dry milling of the corn.

- 2457 • Thin Layer Densitometric Determination of Rotenone and Deguelin**
 NORMAN E. DELFEL and WILLIAM H. TALLENT
 J. Ass. Offic. Anal. Chem. 52(1): 182-187. January 1969

Rotenone and deguelin are separated by chromatography on silver nitrate-impregnated silica gel G with chloroform:acetone:acetic acid (196:3:1) solvent system. Glass plates, 20 X 20 cm., are coated with a special spreader producing a 0.25 mm. layer and a 1.00 mm. band at the upper end. Since additional solvent is required to saturate the thicker band, such plates give resolutions comparable to plates twice as long. Developed plates are treated with nitric acid vapor, then ammonia vapor, to produce dark spots for the rotenoids. Plates are scanned with a

commercial densitometer, and the quantity of rotenoids is calculated from peak area in the resultant curve. Recoveries of rotenone and deguelin added to extracts of *Tephrosia vogelii*, *Lonchocarpus nicou*, and *Derris elliptica* averaged 104.1 and 99.4%, respectively. The standard deviation of the method applied to plant extracts was 7.9% for rotenone and 8.3% for deguelin. The amounts of rotenone in the *L. nicou* samples were comparable to those determined by the AOAC crystallization and infrared methods.

- 2458 • Hydrogenation of Fats**
 H. J. DUTTON
 In "The Chemistry of Fats and Other Lipids," ed. Ralph T. Holman, vol. 9, pt. 3, pp. 351-375. New York. 1968

Progress since 1950 in the hydrogenation of vegetable oils is reviewed.

- 2459 • Characterization of Major Carotenoids in Yellow Maize Lines of Differing Pigment Concentration**
 C. O. GROGAN¹ and C. W. BLESSIN
 (¹Mississippi Agricultural Experiment Station, Mississippi State University, State College)
 Crop Sci. 8(6): 730-732. November-December 1968

Major carotenoids—polyoxy, zeaxanthin, lutein, cryptoxanthin, zeinoxanthin, and carotenes—were determined in 15 lines, 5 high-carotenoid exotic strains, and 5 crosses of maize, *Zea mays* L. In general, zeaxanthin and lutein were major carotenoids. In two flint types, zeaxanthin accounted for 67% of the total carotenoids. However, in certain color separations, cryptoxanthin was the major component. The data indicate that selection for any one of the major carotenoids should be possible. In another phase of the study, seeds from a dark yellow by white segregating population were separated into

nine recognizable color classes. Zeaxanthin was the only fraction to increase before the dark lemon separation, although all fractions except polyoxy showed a sudden increase with this separation. Zeinoxanthin was the major carotenoid in the dark lemon but declined as total carotenoid level increased. Zeaxanthin and lutein were the major carotenoids in all separations darker than light yellow. The data show that it is possible to identify phenotypically high-carotenoid segregates with considerable accuracy when a suitable background is used.

- 2460 • Characterization of Naturally Occurring α -Hydroxylinolenic Acid**
 C. R. SMITH, JR. and I. A. WOLFF
 Lipids 4(1): 9-14. January 1969

The seed oil of *Thymus vulgaris* L. (Labiatae) contains 13% of a new unsaturated hydroxy fatty acid characterized as α^L -hydroxylinolenic acid. This oil also contains the previously unknown norlinolenic

(all-*cis*-8,11,14-heptadecatrienoic) acid (2%) and linolenic acid (55%). The simultaneous occurrence of these three acids suggests that the C₁₇ acid is biosynthesized by α -oxidation of linolenic acid.

- 2461** • **Automated Method to Determine D-Fructose in the Presence of D-Glucose**
M. C. CADMUS and G. W. STRANDBERG
Anal. Biochem. 26(3): 484-487. December 1968

A modified cysteine-sulfuric acid reaction of carbohydrates permits quantitative determination of small amounts of D-fructose in the presence of large excesses of D-glucose. Rates up to 30 samples per hour are realized on an automatic instrument for

analyzing large numbers of samples. Minimal interference from glucose is obtained by incubating the reaction mixture at 37° C. Colorimetric measurements are recorded at 420 mμ. A linear response with fructose standards is achieved up to 200 μg/ml.

- 2462** • **Effects of Storage Condition on Oil Analysis of Milled Corn Fractions by Gas-Liquid Chromatography**
L. T. BLACK, G. G. SPYRES, and O. L. BREKKE
Cereal Chem. 46(1): 63-69. January 1969

Storage of various oil-bearing agricultural commodities usually causes a drop in oil content as measured by extraction with petroleum ether. The phenomenon involved in this change and conditions which affect it have been explored to a limited extent. A gas-chromatographic method, developed at this Laboratory for determining the oil content of dry-milled corn fractions, was used to examine the effects of heat, particle size, and type of atmosphere

on changes in extractable oil content. Ground and unground corn grits were held for various periods under atmospheres of air, oxygen, nitrogen, carbon dioxide, helium, and vacuum and at temperatures ranging from -25° to 160° C. These experiments demonstrated that loss of soluble oil was directly related to storage time, temperature, particle size, and oxygen content of the atmosphere.

- 2463** • **New Crops. A List of Publications and Patents for 1968**
NORTH. UTIL. RES. DEVELOP. DIV.
U.S. Agr. Res. Serv., ARS-71-19-7, 4 pp. February 1969 [Processed]

- 2464** • **A Simple Efficient Liquid-Liquid Atomisation Apparatus for Polymer Purification**
T. K. MIWA
Chem. Ind. (London)(52): 1835-1836. December 1968

A liquid-liquid atomization junction made from concentric glass tubing purifies polymers simply and efficiently. Polymers are displaced from concentrated solution as extremely fine solid particles

or filaments. When compared with conventional purification, the apparatus removes emulsifying agents most efficiently.

- 2465*** • **Complexes of Alkali Metals and Alkaline-Earth Metals with Carbohydrates**
J. A. RENDLEMAN, JR.
Advan. Carbohyd. Chem. 21: 209-271. 1966

The existing knowledge on complexation of alkali and alkaline-earth metals with carbohydrates is comprehensively reviewed. Among the subjects discussed are reactions of metal salts and metal bases, methods of preparing complexes, stoichiometry, influence of the size of the cation on complex stability, influence of the solvent, effect of complexing on optical rotation, electrophoretic behavior

of carbohydrates in aqueous and nonaqueous systems containing either a salt or a base, and the structure of the complex. Complete lists of all known complexes of alkali and alkaline-earth metals are provided. Treatment is given to the formation of alcoholates (oxyanion derivatives) from the reactions of carbohydrates, in liquid ammonia, with alkali metals, alkaline-earth metals, and alkali metal amides.

2466 • Secondary and Tertiary Amines Derived From Pelargonaldehyde and Methyl Azelaaldehyde

E. H. PRYDE, D. E. ANDERS, and J. C. COWAN
J. Amer. Oil Chem. Soc. 46(2): 67-69. February 1969

Reductive alkylation of ammonia with pelargonaldehyde or with methyl azelaaldehyde over Raney nickel catalyst produced dinonylamine or bis(8-carbomethoxyoctyl)amine in good yields. Tertiary amine formation was minimized by the use of two

immiscible solvents. When 10% palladium on charcoal was used in place of the nickel catalyst, trinonylamine and tris(8-carbomethoxyoctyl)amine were formed in good yield in the absence of solvents.

2467 • Integrated System for Microreactor Gas Chromatography

E. D. BITNER, V. L. DAVISON, and H. J. DUTTON
J. Amer. Oil Chem. Soc. 46(2): 113-117. February 1969

A compact unit has been constructed to control and to supply a microreactor apparatus. Features are an ozone generator, gas flow rotameters, solenoid-operated six-way gas valve, and a combination temperature-and-ozone meter. The meter monitors and, by means of a built-in relay, controls reaction temperature. It also affords a visual indication of ozone concentration during reactions. Basic electron-

ic circuits and common laboratory items simplify the unit's construction.

Some possible microreactions to which this integrated system may be applied are ozonization-pyrolysis, esterification, transesterification, saponification, reduction, and halogenation.

2468 • High Oleic Oils by Selective Hydrogenation of Soybean Oil

OVIDIU POPESCU, SAMBASIVARAO KORITALA, and H. J. DUTTON
J. Amer. Oil Chem. Soc. 46(2): 97-99. February 1969

High oleic (monoene) oils were obtained from soybean oil by selective hydrogenation with copper catalysts. A mixture of nickel and copper-chromite catalyst had activity suitable for producing the high monoene oils. A new supported copper catalyst, laboratory prepared, was more active than commercial copper catalysts.

Hydrogenated oils contained 61 to 72% monoenoic and 14 to 24% dienoic acids, and there was essentially no increase in stearic acid. The *trans*-isomer con-

tent of these oils varied between 17 to 32%. Double bonds in the monoene were distributed along the molecule from C₆ to C₁₅, but were located preferentially in the C₉ position for the *cis*-monoene and in the C₁₀ and C₁₁ positions for the *trans*-monoene. When the iodine value of these high monoene oils was about 90 to 95, they remained liquid above 28° C. Citric acid treatment reduced the copper content of hydrogenated oils to a level that was comparable to that of the original soybean oil.

2469 • Linseed Oil for the Preventive Maintenance of Concrete

W. L. KUBIE, L. E. GAST, and J. C. COWAN

In "Maintenance Practices 1967," Highway Res. Rec. No. 254, pp. 61-67. Washington, D.C. 1968

Information is presented on the use of boiled linseed oil solutions and emulsions as antiscaling compounds for concrete. These linseed formulations can be easily applied to concrete with conventional spraying equipment. With the emulsion drying 2 hours after application, serious loss of oil during a rain appears to be eliminated. When subjected to freeze-thaw cycles in the presence of salt, air-entrained concrete highways coated with linseed oil showed increased durability compared to uncoated controls. Tests also indicated that recoating is advantageous for long-term protection.

Laboratory freeze-thaw tests in water and 2% brine were conducted on concrete beams coated with linseed oil emulsions to evaluate its effectiveness as an antiscaling and curing agent. Coated beams showed no loss in 42-day flexural strength over moist-cured controls. Coated beams subjected to 300 freeze-thaw cycles in the presence of water and 2% brine were from 4 to 6 times as durable as uncoated beams.

Preliminary data indicate that linseed oil emulsions may serve as both a curing and antiscaling compound.

2470 • Publications and Patents of the Northern Utilization Research and Development Division, July-December 1968

NORTH. UTIL. RES. DEVELOP. DIV.

U.S. Agr. Res. Serv., Unnumb. Pub., 38 pp. [January 1969]

2471 • Using A Computer to Optimize Cereal Based Food Composition

G. E. INGLET, J. F. CAVINS, W. F. KWOLEK,¹ and J. S. WALL
(¹USDA Biometrical Serv., Peoria, Ill.)

Cereal Sci. Today 14(3): 69-70, 72, 74. March 1969

Supplementation of cereal grains with protein concentrates, amino acids, or a combination of the two, is the most rapid and economical means of increasing protein quality and quantity in the diet of infants and preschool children. In developing countries it is essential that maximum nutrition should be provided at minimum cost. Attainment of this objective could be aided by computer calculations, as illustrated in formulation of prototype cereal-based food products having a prescribed content of protein with optimal patterns of essential amino acids. These prototype

formulas are based on mixtures of two or three protein-contributing or essential amino acid-contributing ingredients. The economics of balancing plant protein amino acid patterns to conform with an animal protein standard are evaluated. Compositional variation of the components is a major factor in programming. More extensive cereal compositional data, including variations in amino acid patterns of cereals with different protein contents and genetic backgrounds, are needed for reliable results from computer calculations.

2472 • Soybean Protein Nomenclature: A Progress Report

W. J. WOLF

Cereal Sci. Today 14(3): 75-76, 78, 129. March 1969

Recent years have witnessed an increase in food uses of soybean proteins and a need for more information about their physical and chemical properties. As a result, research on soybean proteins is increasing and new components are being isolated and characterized. Difficulties of designating the newly isolated components and of distinguishing

them from previously characterized proteins led to the formation in 1967 of a Soybean Protein Nomenclature Committee. This report summarizes the work of the committee so far. Past nomenclature and the various proposals under consideration are reviewed briefly.

- 2473** • **Publications and Patents on Fermentation Research During 1968**
NORTH. UTIL. RES. DEVELOP. DIV.
U.S. Agr. Res. Serv., ARS-71-38-1, 10 pp. March 1969 [Processed]

- 2474** • **Hydroformylation of Unsaturated Fatty Esters**
E. N. FRANKEL, S. METLIN,¹ W. K. ROHWEDDER, and I. WENDER¹
(¹Pittsburgh Coal Research Center, Pittsburgh, Pa.)
J. Amer. Oil Chem. Soc. 46(3): 133-138. March 1969

Unsaturated fatty esters and vegetable oils were hydroformylated with H₂ and CO (3500 to 4600 p.s.i.) and Co₂(CO)₈ to give fatty aldehydes at 100° to 110° C. and fatty alcohols at 175° to 190° C. Yields of C₁₉ oxo products varied from 42 to 84%. Distilled products contained from 50 to 90% branched isomers and from 4 to 16% linear isomers. The proportion of linear isomers increased at higher reaction temperatures and in the presence of tributylphosphine-cobalt carbonyl complex. Linear and branched hydroxy

products were separated by silicic acid column, thin-layer, and gas-liquid chromatography. The linear hydroxy product (from oleate and linoleate) was identified as methyl 19-hydroxynonadecanoate by nuclear magnetic resonance and mass spectrometry. Isomeric branched products were analyzed by mass spectrometry as the diester derivatives. They were identified as a mixture of 5- to 13-carbomethoxy methyl octadecanoate.

- 2475** • **Oriental Fermented Foods Made from Soybeans**
C. W. HESSELTINE and HWA L. WANG
Proc. Ninth Dry Bean Res. Conf., Fort Collins, Colo., Aug. 13-15, 1968
West. Util. Res. Develop. Div.
U.S. Agr. Res. Serv., ARS-74-50, pp. 45-52. February 1969

This review covers briefly foods prepared by the fermentation of soybeans and other legumes. Methods are described for the manufacture of shoyu (soy sauce),

miso, hamanatto, sufu, tempeh, and idli. All are prepared from soybeans, except idli that is made in India from black gram.

- 2476** • **Production of Antibiotics by *Alternaria* Species**
L. A. LINDENFELSER and A. CIEGLER
Develop. Ind. Microbiol. 10: 271-278. 1969

The genus *Alternaria*, only sparsely investigated previously, has been surveyed for potential antibiotic-producing strains. A total of 127 cultures were tested, representing 83 strains of 30 known species and 44 unidentified strains. Solvent extracts of mycelia and broths from shaken-flask cultures were assayed against 17 test organisms, including 5 bacteria, 10 yeasts, 1 mold, and 1 colorless alga. Four of the yeast strains and the one alga were cultures isolated from human and animal pathological cases, and three additional yeasts were known human pathogens.

Of the 127 *Alternaria* strains tested, 86 produced antibiotics. The majority (75) were active against

gram-positive bacteria; 24 also demonstrated activity against gram-negative and 43 against acid-fast bacteria. Seventeen were antifungal; 26 demonstrated activity against one or more of the 10 yeasts; and 10, against the colorless alga. Five were active in all categories.

Paper strip chromatography, in which three different solvent systems were used, revealed broad differences among many of the antibiotics. The R_f values of a considerable number were close, indicating similarities of many of the active factors. Ultraviolet spectra of solvent extracts and culture filtrates showed that all the antibiotics were non-polyenic.

2477

- **Processing of Soybeans**

R. J. DIMLER

Proc. 17th Cottonseed Processing Clinic, New Orleans, La., Feb. 12-13, 1968
South. Util. Res. Develop. Div.

U.S. Agr. Res. Serv., ARS-72-69, pp. 48-60. January 1969

Soybean production has been increasing in the United States, particularly in the South. Considerable potential exists for a worldwide increase in the supply and use of soybeans. The processing for oil and meal is reviewed, with indications of the outlets for the products. Research activities are directed

toward improvements in oil properties and toward food uses of the meal and protein. Comments on processes developed at the Northern Division for producing full-fat soy flour serve to illustrate some of the progress being made on soy products as food supplements.

2478

- **Reactions of Azelaaldehydic Esters**

E. H. PRYDE and J. C. COWAN

J. Amer. Oil Chem. Soc. 46(4): 213-218. April 1969

Alkyl azelaaldehydates and their acetals can undergo reactions at either the aldehyde or the ester group to form a variety of novel and reactive monomers and polymers. Pertinent reactions of the aldehyde group (and resultant products) include acetalization with pentaerythritol (diester-acetal), acetalization with glycerol (hydroxy ester-acetal), hydrogenation (hydroxy ester) reductive alkylation of ammonia (amino acid and imino diester), aldolization (dibasic acid),

and hydrazone formation (azine dibasic acids). Reactions at the ester group include aminolysis (diacid amides) and hydrazinolysis (hydrazide acetal). These various products can undergo self-condensation or condensation with glycols or diamines to form polyesters, polyamides, poly(ester-acetals), and poly(amide-acetals). Polymers with cyclic acetal structures in the polymer backbone have latent crosslinking capabilities.

2479

- **Substrate Conversion by Fungal Spores Entrapped in Solid Matrices**

D. E. JOHNSON and A. CIEGLER

Arch. Biochem. Biophys. 130(1-2): 384-388. March 1969

Conditions for the operation of a fungal spore-continuous column process are described wherein sucrose inversion is used as a model detection system. ECTEOA-cellulose, acting as a solid support, provides good retention and flow-rate characteristics in columns prepared with *Aspergillus* and *Penicillium* spores. Spore columns so prepared

are stable and need only a cursory washing before storage or reuse. Germination on the column is negligible. The interactions occurring between variations in spore concentration, substrate concentration, and flow rate are reported, including the effect each has upon product yield.

2480

- **A Rapid Microozonolysis-GLC Procedure for Locating Unsaturation in Olefinic Acids, Including Trienes and Tetraenes**

R. KLEIMAN, G. F. SPENCER, F. R. EARLE, and I. A. WOLFF

Lipids 4(2): 135-141. March 1969

Increased versatility has been achieved in the identification of unknown olefinic fatty acids by ozonolysis. The method has been applied to purified methyl esters containing up to four double bonds. Aldehydic fragments, from esters by the Stein-Nicolaides procedure, were determined by gas liquid chromatography (GLC) on two columns of different polarity. Equivalent chain lengths of each fragment on the two columns provide identification. For monoenoic esters the location of the double bond is

clearly indicated by the aldehyde and aldehyde-ester fragments. Dienes are identified by the aldehyde and aldehyde-ester fragments when the original chain length of the ester is known; the dialdehyde fragment provides confirmatory evidence. Trienes and tetraenes are analyzed by interrupting the ozonolysis at various times, thereby producing unsaturated, as well as saturated, aldehydes and aldehyde-esters. Unsaturated fragments locate the central or interior double bonds.

2481 • Boron Trifluoride as Catalyst to Prepare Methyl Esters From Oils Containing Unusual Acyl Groups

R. KLEIMAN, G. F. SPENCER, and F. R. EARLE
Lipids 4(2): 118-122. March 1969

The procedure of Metcalfe and coworkers for the preparation of fatty acid methyl esters, using boron trifluoride as catalyst, is suitable for use with oils containing fatty acids of unusual structures, such as conjugated unsaturation, hydroxy or epoxy groups, and cyclopropenes in addition to oils with only the

common acids. In some oils, boron trifluoride was less destructive to unusual groups than conventional mineral acid catalysts; in others, derivatives were formed that were suitable for quantitation in subsequent gas chromatographic analysis.

2482 • Cis-5 Monoenoic Fatty Acids of *Carlina* (Compositae) Seed Oils

G. F. SPENCER, R. KLEIMAN, F. R. EARLE, and I. A. WOLFF
Lipids 4(2): 99-101. March 1969

Seed oils of *Carlina corymbosa* L. and *C. acaulis* L. contain *cis*-5-octadecenoic acid as a major fatty acid (21 to 24%). This acid has not been previously reported as a constituent of Compositae seed oils. The predominant fatty acid in the *Carlina* oils is

linoleic (50 to 52%); lesser amounts ($\leq 10\%$ each) of palmitic, stearic, and oleic acids are also present. The oil of *C. acaulis* has almost 2% of *cis*-5-hexadecenoic acid; *C. corymbosa* oil includes minor amounts of some oxygenated fatty acids.

2483 • Improved Resolution in High-Sensitivity Dual-Label Gas Radiochromatography

PAUL J. THOMAS and H. J. DUTTON
Anal. Chem. 41(4): 657-660. April 1969

The simultaneous and independent measurement of carbon-14 and tritium isotopes in compounds separated by gas-liquid chromatography can be performed by automatic serial collection of fractions in vials with subsequent scintillation counting. This paper describes the application of digital computer techniques to speed the analysis of counting data, to improve the sensitivity and resolution of the analysis, and to plot the individual isotopic curves. This improvement is achieved by combining and averaging the re-

sults of two to four replicate analyses of a given sample into a single plot of radioactivity vs. chromatographic retention time. With these techniques, samples having an activity of around 1 to 10 nanocuries/mg. can be easily analyzed. The profile of radioactivity vs. chromatographic retention time is superior in its signal-to-noise ratio, in its resolution of closely spaced peaks, and in its sensitivity to that obtainable with any continuous flow system.

2484 • Fluorescent Compounds and Azo Dyes from Starch Anthranilates

C. L. Mehlretter
Ind. Eng. Chem., Prod. Res. Develop. 8(1): 77-79. March 1969

Nucleophilic reaction of cornstarch in granule form with isatoic anhydride in water in the presence of alkali at pH 8 to 12 introduces anthranilyl groups along the polymer chain. Isatoic anhydride is a novel esterification agent for starch and modified starches, and high conversion to the anthranilates is achieved under the conditions developed. Cooked pastes of products of low degree of substitution show appreciable thickening on cooling, but are heat-reversible.

Starch anthranilate and its aqueous dispersions fluoresce in the ultraviolet, with peak absorption and emission at 343 and 424 $m\mu$, respectively. Diazotization of granular starch anthranilate, followed by coupling with appropriate aromatic compounds, affords azo dyes attached to starch by covalent bonds. Pastes of the dyes may have value in printing and sizing processes.

2485

• **Inversion of Sucrose by Fungal Spores**

G. E. N. NELSON, D. E. JOHNSON, and A. CIEGLER

Develop. Ind. Microbiol. 10: 284-289. 1969

We are investigating fungal spores as potential fermentative agents. Conidia of *Aspergillus oryzae* and several other species hydrolyze sucrose to invert sugar, a commodity useful in the food industry. Conidia of *A. oryzae* (10^8 spores/ml.) form reducing sugar equivalent to 70 to 80% of an initial 0.5 *M* sucrose solution in 6 hours at 35° C. Temperature changes between 25° C. and 35° C. do not

significantly affect inversion. In storage at 5° C., spores maintain a high level of activity as long as 3 months. No difference in activity appears between "starved" and "unstarved" spores. The pH level has a marked effect on inversion rate; the optimum is 4 to 5. Spores in columns are active in sucrose inversion, although less so than in shaken flasks.

2486

• **Net Synthesis of ^{14}C -Labeled Lipids and Aflatoxins in Resting Cells of *Aspergillus parasiticus***

R. W. DETROY and C. W. HESSELTINE

Develop. Ind. Microbiol. 10: 127-133. 1969

Aeration, pH, and acetate concentration of resting-cell suspensions of *Aspergillus parasiticus* markedly affect the synthesis of lipid and aflatoxin by this organism. To assess the physiological significance of these changes, synthesis of ^{14}C -labeled aflatoxin and lipid was examined under varying conditions in glucose-salts resting-cell medium. Incorporation of ^{14}C -acetate into aflatoxin by nonproliferating washed cells was favored by acidic conditions (pH 5.0 to 3.0); whereas a neutral or slightly alkaline resting-cell medium increased lipid synthesis severalfold. Above pH 5.0 aflatoxin synthesis fell off sharply. Increase in acetate from 10^{-3} *M* to 3.7×10^{-2} *M* produced a 200-fold increase in ^{14}C radioactivity incorporated into lipid material, but aflatoxin production was almost completely blocked. When the resting-cell suspension was sparged with air in the presence of acetate and glucose, the total amount of ^{14}C -labeled lipid formed after a 48-hour

incubation at 28° C. was 225- to 500-fold greater than that in nonsparged experiments. Aeration had no striking effect upon aflatoxin production except during prolonged incubation; however, incubations under an N_2 atm resulted in a 95 to 100% inhibition of both lipid and toxin synthesis. At the termination of incubation periods, cells were harvested and extracted with chloroform-methanol 5:1 (v/v). The aflatoxins were separated by silica gel thin-layer chromatography (TLC). A double-development procedure employing first a polar and then a nonpolar solvent system was used for complete TLC of the main lipid classes. All the ^{14}C activity occurred in a triglyceride component in the chloroform extracts after the isolation of the aflatoxins. Preliminary conclusions are that the synthesis of aflatoxin may be controlled by the direction of carbon precursors into lipid synthesis by changes in environmental conditions.

2487

• **Progress in Clarification of the Taxonomic and Nomenclatural Status of Some Problem Actinomycetes**

T. G. PRIDHAM and A. J. LYONS, JR.

Develop. Ind. Microbiol. 10: 183-221. 1969

Whole-cell hydrolyzates of several hundred *Actinomycetales* cultures were examined by paper and thin-layer chromatography for the presence of isomers of diaminopimelic acid, hexoses, and pentoses. These cultures represent a 15-year collection of strains accumulated because some obviously were not members of the genera *Streptomyces* Waksman and Henrici 1943 or *Streptovorticillium* Baldacci *emend.* Baldacci, Farina, and Locci 1966; because some formed no macroscopically visible aerial mycelium; or because no

precise placement in a morphological category could be made.

The work of other investigators was confirmed, and our results point out the value of simple-cell compositional studies for aiding in generic placement of strains. A number of cultures received as streptomycetes certainly can be removed from the genus *Streptomyces* Waksman and Henrici 1943, and relationships between certain antibiotic-producing strains are clarified.

2488 • Nylons from Vegetable Oils: -13, -13/13, and -6/13

R. B. PERKINS,¹ J. J. RODEN III,¹ A. C. TANQUARY,¹ and I. A. WOLFF
(¹Southern Research Institute, Birmingham, Ala.)
Mod. Plast. 46(5): 136-137, 140, 142. May 1969

Monomers for nylons-13 and -13/13 are made from erucic acid, obtained from the commercially available seed oil of *Crambe abyssinica*, as is the 13-carbon dibasic acid (brassylic acid) that is combined with hexamethylenediamine to make nylon-6/13. The low water absorption of these nylons makes

them suitable for uses requiring retention of strength, toughness, abrasion resistance, and electrical properties under varying conditions of humidity. These nylons can be compression or injection molded, and extruded to form rods, films, or filaments.

2489 • Mechanistic Studies on the Chemistry and Photochemistry of Sulfur-Containing Amino Acids, Peptides, and Proteins

MENDEL FRIEDMAN

In "Mechanisms of Reactions of Sulfur Compounds," eds. N. Kharasch, B. S. Thyagarajan, and A. I. Khodair, vol. 2, pp. 145-160. Intra-Science Research Foundation, Santa Monica, Calif. 1968

Disulfide bonds associated with cystine residues are structural units essential in most proteins and enzymes. Disulfide bridges in proteins, together with hydrogen-bonding and hydrophobic interactions, are largely responsible for conformations and configurations that proteins assume in solution and in a solid state. Thiol groups have been proposed as active sites for several enzyme systems.

Sulfide, disulfide, and thiol groups in amino acids, peptides, and proteins are uniquely susceptible to radiation energy ranging from the visible to gamma rays. These functional groups are therefore directly involved in the chemistry of radiation damage and radiation protection in plants and animals. The susceptibility of disulfide links in keratins to alkali has an undesirable effect on the characteristics of wool fibers. Evidence is accumulating which seems

to indicate that sulfhydryl-disulfide interchange reactions in gluten proteins affect the baking quality of flour. The nature of radiation-induced transformations of sulfur-containing amino acid residues of proteins present in foods is of practical importance in radiation preservation of foods.

For these reasons, the chemistry of sulfur-containing compounds is important to the chemically, biologically, and agriculturally oriented scientist. This area of research is actually interdisciplinary in nature. Recent mechanistic studies are summarized on the chemistry and photochemistry of sulfur-containing amino acids, peptides, and proteins. Almost all areas of research cited are still under active investigation in many laboratories, and some of the interpretations included are still controversial.

2490 • Sulfated Wheat Flours of Low Sulfur Content

HERBERT E. SMITH, CHARLES R. RUSSELL, MARGARET M. HOLZAPFEL, and CARL E. RIST
Northwest. Miller 276(4): 13-15. April 1969

Ungelatinized flour sulfates were prepared by treating 87 grams (dry basis) of hard red winter wheat flour with 1 to 3 grams of trimethylamine-sulfur trioxide in an aqueous alkaline system for 4 to 24 hours at 25° C. Products with -SO₂H content ranging from 0.63 to 1.29% were obtained in weight yields of 78 to 83%. The extent of sulfation was influ-

enced by the amount of sulfating agent used. Based on nitrogen analyses, the average loss of flour protein, ranging from 68 to 94%, indicated that during sulfation soluble proteinaceous materials formed which were removed during isolation of the sulfated product. Intrinsic viscosities indicate that the average molecular weights of components in flour sulfates and control flours are comparable.

2491* • Flavor and Oxidative Stability of Sunflower OilC. D. EVANS and ROY SHAW¹

(¹Red River Valley Potato Processing Laboratory, East Grand Forks, Minn.)
 Proc. 3rd Int. Sunflower Conf., Northwest Exp. Sta., Univ. of Minnesota,
 Crookston, Minn., August 13-15, 1968, pp. 101-118. March 1969

Sunflower oil is characterized as a semidrying oil because its iodine value of about 138 is high. Nevertheless, its major use has always been as an edible oil. Only two polyunsaturated acids contribute to the high iodine value of sunflower oil; namely, linoleic acid at 70% levels and trace amounts (0.2 to 0.3%) of linolenic acid. In reviewing the composition of 11 commercial varieties of sunflowers, other investigators concluded that fatty acid composition is not significantly influenced by variety. Oils from

individual sunflower seeds in both inbred lines and commercial varieties have a wide range of fatty acid composition. Oils low in linoleic acid have been reported. The Krasnodarets variety has only 46.4% linoleic acid in oil. Some single seeds of the Peredovik variety contain less than 50% linoleic acid. Sunflower oils having a low content of linoleic acid may have somewhat different keeping qualities and stability characteristics than the sunflower oil we studied.

2492* • Explanation of Ionic Sequences in Various Phenomena. VII. The Concentration Dependence in Molecular Weight Determinations of Polyelectrolytes

STIG R. ERLANDER and G. E. BABCOCK

J. Macromol. Sci.-Chem., A2(8): 1493-1520. December 1968

The molecular weight of bovine plasma albumin (BPA) was examined by ultracentrifugal molecular weight determinations at low pH values in various concentrations of guanidinium thiocyanate (GSCN). The electrostatic charge on BPA under such conditions is approximately +100 for a molecular weight of about 70,000. It was shown that the value of B_w as obtained from the equation $(1/\bar{M}_w^{app}) = (1/\bar{M}_w^{ext}) + B_w(C_a + C_b)/2$ goes through a minimum at concentrations slightly less than 2.5 M GSCN for both dialyzed and undialyzed samples. The results illustrate that the value of the net electrostatic charge on BPA varies with the absolute concentration of salt and BPA. The minimum B_w is due to a reversal of charge phenomenon. At 2.5 M GSCN or higher the net charge on BPA is negative rather than positive because of the association of counterions. The greater the solubility of the counterion, the greater will be the reversal of charge effect. Addition of a more soluble salt therefore reduces the value of B_w faster than a less soluble

salt. The extrapolated molecular weight values of BPA were the same whether dialysis was or was not carried out. This is because in most cases extrapolation of $1/\bar{M}_w^{app}$ to zero polyelectrolyte concentration is the same as extrapolation to zero net charge. The equations of Casassa and Eisenberg and of Scatchard and co-workers are therefore in error because they neglected to consider the variation in the net charge with a variation in the concentration of salt and polyelectrolyte. Plots of $\bar{M}_w^{app}/\bar{M}_z^{app}$ versus polyelectrolyte concentration can be used to detect erratic changes in the reversal of charge phenomenon. Such erratic changes are caused by greater association constants between counterion and polyelectrolyte because of clusters of charged groups on the polyelectrolyte. When $\bar{M}_w^{app}/\bar{M}_z^{app} > 1$ and increases with polymer concentration, extrapolation to $C_p = 0$ may not give the true molecular weight of the polymer because the net electrostatic charge may be unequal to zero at $C_p = 0$.

2493 • Rate of Oxygen Uptake of Healthy and Diseased Larvae of the Japanese Beetle

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(¹USDA Biometrical Serv., Peoria, Ill.)
J. Invertebr. Pathol. 13(2): 250-255. March 1969

Conventional Warburg vessels were used to secure oxygen uptake data on healthy and milky diseased larvae of the Japanese beetle (*Popillia japonica*). The mean $Q_{O_2}^0$ live larvae (LL) and 95% confidence limits were as follows: healthy third-instar larvae, 0.392 ± 0.047 ; milky third-instar larvae, 0.312 ± 0.050 ; refrigerated third-instar larvae, 0.156 ± 0.048 ; and early pupae, 0.332 ± 0.058 . Repeated determination of $Q_{O_2}^0$ LL on single larvae for 6 hours resulted in steadily decreasing values. No significant

correlation existed between oxygen uptake and the dissolved oxygen content of the hemolymph. Injury to larvae caused by insertion of a polarograph needle for dissolved oxygen determination decreased $Q_{O_2}^0$ LL values. After 1 day the rate of oxygen uptake was seen to return to the initial level. Regression analysis failed to establish a correlation between the concentration of microorganisms in diseased third-instar larvae and $Q_{O_2}^0$.

2494 • Course of Sporulation of *Bacillus popilliae* in Liquid Medium Containing Activated Carbon

WILLIAM C. HAYNES and LENORA J. RHODES
J. Invertebr. Pathol. 13(2): 161-166. March 1969

Refractile spores of *Bacillus popilliae*, causative agent of the milky disease in Japanese beetle (*Popillia japonica*) larvae, appear in liquid culture in the presence of activated carbon during the early part of the second week of incubation. Forms resistant to drying occur during the first week when no refractile spores are seen. They usually number no more than a few hundred per milliliter, and they vary in their resistance from day to day. During the

second week when refractile spores are present, the number of resistant forms rises to a peak in the vicinity of 100,000 per milliliter and then gradually decreases throughout the rest of a 3-week observation period. Refractile spores often disappear toward the end of the third week. Thus, the terminal resistant forms may consist largely of slowly germinating spores.

2495 • D-Mannitol Metabolism by *Aspergillus candidus*

GERALD W. STRANDBERG
J. Bacteriol. 97(3): 1305-1309. March 1969

Pathways of mannitol biosynthesis and utilization in *Aspergillus candidus* NRRL 305 were studied in cell-free extracts of washed mycelia prepared by sonic and French pressure cell (FPC) treatments. A nicotinamide adenine dinucleotide-linked mannitol-1-phosphate (M1P) dehydrogenase was found in FPC extracts of D-glucose-grown cells, whereas a specific mannitol-1-phosphatase was present in extracts prepared by both methods. The existence of these two enzymes indicated that mannitol may be synthesized in this organism by the reduction of fructose-

6-phosphate. A specific nicotinamide adenine dinucleotide phosphate-linked mannitol dehydrogenase was also identified in both extracts. This enzyme may be involved in mannitol utilization. However, the level of the mannitol dehydrogenase appeared to be substantially reduced in extracts from mannitol-grown cells, whereas the level of M1P dehydrogenase is increased. A hexokinase has been identified in this organism. Fructose-6-phosphatase, glucose isomerase, and mannitol kinase could not be demonstrated.

2496

• **Biological Evaluation of Crambe Seed Meals and Derived Products by Rat Feeding**

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Cereal Chem. 46(2): 145-155. March 1969

Diverse hydrolytic reaction products have been identified that are derived from the major crambe seed thioglucoside, *epi*-progoitrin (*e*-PG), and the responsiveness of the reaction pathway to controllable environmental factors has been clarified. Principal product of thioglucoside breakdown by thioglucosidase(s) in crambe meal is either a mixture of three nitriles, the oxazolidinethione (*R*)-goitrin, or some combination of these substances. Such elucidation of products from thioglucosidase activity has made it possible to conduct rat-feeding studies on definitively characterized crambe meals, as well as on compounds or fractions of known chemical composition derived from them.

Inclusion of 0.23% (*R*)-goitrin in rat diets decreased growth to 85% of that of a control group. A mild hyperplastic goiter and a mild degenerative non-specific alteration of liver cells were the only microscopic changes detected. Similar growth restriction resulted when comparable levels of *e*-PG

were fed, incorporated into the diet either as an isolate or in a crambe meal in which thioglucosidase enzyme(s) had been inactivated. In contrast, either autolyzed meal that contains the nitrile mixture, or the nitrile mixture itself after isolation from the meal by extraction, was more harmful. Both caused poorer growth or death, and resulted in bile-duct hyperplasia, fibrosis, and megalocytosis of hepatocytes and tubular epithelial cells in the kidney. Rats fed meal containing intact *e*-PG plus active thioglucosidase enzyme(s) had similar but milder lesions than did rats fed the nitrile mixture. Fibrosis was not observed; thyroid hyperplasia occurred.

Protein efficiency ratios (PER) were determined on defatted crambe meals that had been made non-toxic by aqueous acetone extraction without use of elevated temperatures. The PER's of 2.75 and 2.55 were higher than that of casein (2.50).

2497

• **Gas Chromatographic Characterization by Equivalent Degree of Polymerization and Incremental Equivalent Chain Length Constants. Application to Poly(ethylene glycol) and Ethylene Glycol Derivatives**

THOMAS K. MIWA

Anal. Chem. 41(2): 307-310. February 1969

Every atom or functional unit in an entire molecule can be assigned an incremental Equivalent Chain Length (ECL) that contributes to the totalized ECL of the molecule. For example, in ethylene glycol each terminal hydrogen atom, oxygen atom, and methylene unit has an incremental ECL of -0.3₀, +2.3₀, and +0.1₀, respectively. Such an assignment of characteristic constants is based on the linear relationship that exists between the degree of polymerization of poly(ethylene glycol) and the logarithm of its isothermal gas chromatographic retention time. Terminal alkyl substituents affect the retention of their parent glycols by characteristic constant values, observed as deviations in retention

from that of the parent glycols and expressed either as Equivalent Degree of Polymerization (EDP) or as ECL. The equation for conversion is $ECL = 2.5EDP + 1.7$, when Apiezon L is the liquid phase at 230° to 250° C. Application of the incremental ECL method is illustrated for (1) ethylene glycol and its oligomers; (2) commercially available monoalkyl ethers of ethylene glycol and di(ethylene glycol); (3) the dimethyl ethers--diglyme and triglyme; (4) the cyclic ethers--*p*-dioxane and tetrahydrofuran; (5) the structural derivative by dehydroxylation of di(ethylene glycol)--ethyl ether; and (6) the hydroxymethylated derivative of ethylene glycol--glycerol.

- 2498** • **Formation of a C²² Dihydroxyketo Acid by a Yeast**
RONALD F. VESONDER and FRANK H. STODOLA
Can. J. Chem. 47(7): 1247-1249. April 1969

Saponification of extracellular lipids from the yeast NRRL YB-2501 yielded 8,9,13-trihydroxydocosanoic acid and a new keto dihydroxy acid of melting point 131° to 132° C. The keto acid was shown to

be 8,9-dihydroxy-13-oxodocosanoic acid by conversion to 5-ketotetradecanoic acid and suberic acid. The configuration of the vicinal hydroxyls in the two acids was shown to be *erythro*.

- 2499** • **Biological Activity of Aflatoxin B_{2a}**
E. B. LILLEHOJ and A. CIEGLER
Appl. Microbiol. 17(4): 516-519. April 1969

The toxicity of aflatoxin B_{2a} (hydroxydihydroaflatoxin B₁) was studied in several biological systems. Aflatoxin B_{2a} is the monohydroxylated derivative obtained from adding water to the double bond of the terminal furan of B₁. Examining the sensitivity of a group of microorganisms to B_{2a} demonstrated that the inhibitory spectrum was similar to aflatoxin B₁. However, the toxicity of B_{2a} was markedly lower than B₁, as measured by the

initiation of bile duct hyperplasia in ducklings. Binding of aflatoxin to deoxyribonucleic acid (DNA) was determined by measuring the hypochromicity produced by the nucleic acid at 363 mμ and the capacity of increasing amounts of DNA to quench the fluorescence of the toxin was also used as a measure of the binding of toxin to nucleic acid. These tests showed that the DNA-binding capacity of B_{2a} was lower than B₁.

- 2500*** • **Hybridization as a Basis for Speciation in the Genus *Hansenula***
L. WICKERHAM
In "Yeasts," The Proceedings of the 2nd Symposium on Yeasts, held at Bratislava, Czechoslovakia, July 16-21, 1966, pp. 41-44. 1969

Homothallic species of *Hansenula* are capable of hybridizing when subjected to a rigorous procedure in which the two species are induced to go through their cycles three times serially. The strains are selected for reciprocal differences in ability to assimilate two carbon sources. The hybrids are

then separated from the parental cultures by biochemical selection based on these compounds. Hybrids produced by crossing different species are much less capable of producing offspring than the parent cultures.

- 2501** • **Homogeneous Catalytic Hydrogenation of Unsaturated Fats: Group VIB Metal Carbonyl Complexes**
E. N. FRANKEL and F. L. LITTLE
J. Amer. Oil Chem. Soc. 46(5): 256-261. May 1969

Carbonyl complexes of Cr, Mo, and W have been studied as soluble catalysts for the hydrogenation of methyl sorbate and of methyl esters from soybean oil. Under certain conditions these complexes reduced methyl sorbate respectively to methyl 2-, 3-, and 4-hexenoates as main products.

The more active and thermally stable Cr(CO)₃ complexes catalyzed effectively the hydrogenation of linoleate and linolenate in soybean oil esters with little or no stearate formation. The Cr(CO)₃ complexes are unique in catalyzing the hydrogenation of polyunsaturated fatty esters to monounsaturated fatty esters of low *trans* content.

- 2502** • **Selective Hydrogenation of Soybean Oil: IV. Fatty Acid Isomers Formed With Copper Catalysts**
S. KORITALA and H. J. DUTTON
J. Amer. Oil Chem. Soc. 46(5): 245-248. May 1969

Two samples of soybean oil hydrogenated with copper-containing catalysts at 170° and 200° C. were analyzed for their natural and isomeric fatty acids. Methyl esters of the hydrogenated oils were separated into saturates, monoenes, dienes, and trienes by countercurrent distribution between acetonitrile and pentane-hexane. Monoenes were further separated into *cis*- and *trans*-isomers on a silver-saturated resin column. Double bond location in these fractions was determined by a microozonolysis-pyrolysis technique. The diene fraction was separated with an argentation countercurrent distribution method, and linoleate was identified by infrared,

ozonolysis, and alkali-isomerization data.

The double bonds in the *cis*-monoenes were located in the 9-position almost exclusively. However, the double bonds in the *trans*-monoene were quite scattered with 10- and 11-isomers predominating. About 86 to 92% of the dienes consisted of linoleate as measured by alkali isomerization. Other isomers identified as minor components include *cis,trans* and *trans,trans* conjugated dienes and dienes whose double bonds are separated by more than one methylene group.

- 2503** • **Copolymers of Starch and Polyacrylonitrile: The Dilution Effect**
GEORGE F. FANTA, ROBERT C. BURR, C. R. RUSSELL, and C. E. RIST
J. Appl. Polym. Sci. 13(1): 133-140. January 1969

In the ceric ammonium nitrate-initiated graft polymerization of acrylonitrile (AN) with starch, grafting frequencies and molecular weights of grafted polyacrylonitrile changed from 600 anhydroglucose units (AGU) per graft and 120,000 to 280 AGU per graft and 36,000 when concentrations of starch and

AN were varied from 0.27 and 1.20 to 0.023 and 0.235 moles per liter of water, respectively. The influence of variety of starch, size of the starch granules, and reaction time was studied and also the possible reasons why reactant concentration affects composition of the copolymer.

- 2504** • **Reactivity Ratios for Copolymerization of Vinyl Chloride with 2-Methylpentyl Vinyl Brassylate by Computerized Linearization**
SHU-PEI CHANG, THOMAS K. MIWA, and WILLIAM H. TALLENT
J. Polym. Sci., Pt. A-1, 7(2): 471-477. February 1969

A computerized version of the Fineman-Ross linearization procedure was used to determine reactivity ratios for copolymerization of vinyl chloride (monomer 1) and 2-methylpentyl vinyl brassylate (monomer 2). From differential refractometry data for the products of low-conversion copolymerization, the procedure gave $r_1 = 1.06$ and $r_2 = 0.234$. The ratios computed from chlorine contents of the same products were $r_1 = 1.10$ and $r_2 = 0.239$. The polarity factor (e_2) and general monomer re-

activity (Q_2) calculated for monomer 2 from these ratios were, respectively, -0.95 to -0.98 and 0.032-0.033. The interquartile range for the copolymerization of a mixture of 60% monomer 1 and 40% monomer 2 was 1.4%. These values suggest that from suitable proportions of reactants, sufficiently homogeneous distribution of monomers can be achieved in copolymers of vinyl chloride and 2-methylpentyl vinyl brassylate to offer the possibility of effective internal plasticization.

2505 • Continuous Production of Graft Copolymers of Starch with Acrylamide and Acrylic Acid by Electron Preirradiation

ZOILA REYES,¹ CARROLL F. CLARK,¹ MARIE COMAS,¹

C. R. RUSSELL, and C. E. RIST

(¹Stanford Research Institute, Menlo Park, Calif.)

Nucl. Appl. 6(5): 509-517. May 1969

The development of practical processes, involving electron preirradiation, for large-scale production of graft copolymers of starch with acrylamide (AA) and acrylic acid (AAc) was studied. In the pilot plant built to explore the continuous production of AA- and AAc-starch grafts, starch was fed continuously to a vibrating trough which transported the starch as a thin layer under the beam of a 1-Mev resonant transformer. The irradiated starch then fell into a

tank where it reacted with a solution of either AA or AAc fed simultaneously to the tank reactor. Large samples of AA- and AAc-starch grafts were prepared at various grafting levels, and their physical and chemical properties were determined. Process flow sheets were prepared, and preliminary investment and production cost estimates were made for plants capable of producing 5,000,000 pounds annually.

2506 • Ochratoxin A: Occurrence as Natural Contaminant of a Corn Sample

ODETTE L. SHOTWELL, C. W. HESSELTINE, and MARION L. GOULDEN

Appl. Microbiol. 17(5): 765-766. May 1969

Ochratoxin A has been detected as a natural contaminant for the first time. In a survey for the presence of mycotoxins, one corn sample from commercial markets contained levels of ochratoxin A of 110 to 150 p.p.b. Identity of the metabolite as

ochratoxin A was based on mobility on thin-layer plates in three solvent systems, solubility in 0.1 *M* sodium bicarbonate, formation of methyl ester with same mobility as ochratoxin methyl ester, and activity against *Bacillus megaterium*.

2507 • Optical Rotatory Dispersion of Amylose Films

R. M. PURVINAS and H. F. ZOBEL

Carbohyd. Res. 10(1): 129-139. May 1969

There is a direct correlation between the structure of amylose in the solid state, as determined by X-ray diffraction, and the conformation of amylose in solution. The specific rotations of amylose films showing a methyl sulfoxide complex (V_{Me_2SO}), amorphous, or alkali-amylose structure are the same as those of amylose in corresponding solutions of methyl sulfoxide, 0.5 *M* potassium chloride, or 0.1 to 0.5 *M* potassium hydroxide. The rotation of amylose films that give a B-type of X-ray pattern is higher than that of either amylose *V* or amorphous films; this higher rotation is attributed to the presence of intermolecular hydrogen-

bonds between adjacent amylose chains in the B structure. It is also shown that rotatory dispersion data, alone, cannot be used to establish the conformation of amylose in solution, since the parameter λ_c in the Drude equation is insensitive to changes in structure; that is, amylose V_{Me_2SO} , *V*, and watersoaked B films all have a λ_c of 150 $m\mu$. X-ray, optical rotation, and published viscosity data lead to the conclusion that there is a continuous transition from a stiff, tightly coiled helix in methyl sulfoxide to a flexible coil in neutral, aqueous solution.

- 2508** • **Kneaf Juice: Composition and Use in Fermentation Media**
 M. O. BAGBY, I. A. WOLFF, and M. C. CADMUS
 Tappi 52(3): 442-445. March 1969

Some methods being evaluated for storage of green kenaf before its use as a pulping raw material involve preliminary expression of juice, which would then become a byproduct. Hence, its gross composition was examined as a basis for suggesting possible uses. Juice from kenaf grown in Texas and Illinois was studied. Juice solids contained 15 to 20% sugars, which were mainly fructose and glucose. The nitrogen (1.8 to 3.4% of solids) was mainly in nonprotein form. Amino acids released by acid hydrolysis from peptides present included large percentages of the acidic amino acids, glutamic and aspartic. Nearly one-fourth of the juice solids

was ash. The Texas and Illinois juice samples were qualitatively similar though amounts of some constituents varied, probably because of differing plant maturity at time of harvest.

Kenaf juice appears to be a promising nutrient for fermentation media. Several selected microorganisms grow well on it. Initial results from more intensive studies with two polysaccharide-forming bacteria, *Xanthomonas campestris* and *Arthrobacter viscosus*, revealed marked improvement in polymer yield over that from conventional nitrogen sources.

- 2509** • **Albumins and Globulins in Extracts of Corn Grain Parts**
 J. W. PAULIS and J. S. WALL
 Cereal Chem. 46(3): 263-273. May 1969

Experiments were run to determine the nature of differences between water-soluble and saline-soluble proteins in parts of the corn kernel. Of several extractants tested, neutral 0.5 M NaCl yielded the most protein from corn meal, and this protein gave the best starch-gel electrophoretic patterns. Extracts with this solvent were prepared from separate germ and endosperm portions of corn. Dialysis against distilled water separated these extracts of germ and endosperm into water-soluble albumins and globulin precipitates. Amino acid analysis of albumins and globulins from both germ and endosperm showed only small differences. Starch-gel electrophoresis demonstrated differences between albumin and globulin fractions both in

endosperm and germ; however, patterns of endosperm and germ fractions were similar. Albumins of endosperm were chromatographed in different buffers on columns of crosslinked dextran. The chromatographic peaks contained components differing in mobilities on gel electrophoresis. Chromatography with an alkaline buffer resulted in larger amounts of materials that eluted early than when acid buffers were used. This effect of alkali was not reduced by addition of 6 M urea to this buffer or by reduction and alkylation of disulfides of the protein. The isolated germ protein could only be completely resolubilized in alkaline buffers in which it exhibited more of a high-molecular-weight component than does endosperm albumin.

2510 • Distribution and Subcellular Structure of Endosperm Protein in Varieties of Ordinary and High-Lysine Maize

M. J. WOLF, U. KHOO, and H. L. SECKINGER

Cereal Chem. 46(3): 253-263. May 1969

All varieties of corn show a high protein content in the peripheral endosperm beneath the aleurone layer, and a decreasing gradient of protein concentration from the periphery inward. In addition to the common starchy types of endosperm cell, small amounts of two kinds of high-protein cells containing little or no starch were noted: (1) high-protein cells scattered at random among starchy cells are common in *floury* mutants, *floury-1* and *opaque-1*; (2) special high-protein cells occur only in the subaleurone area, usually as a fragmentary layer.

Subcellular protein bodies soluble in ethanol, dimethyl sulfoxide, and acetone are characteristic

of the protein structure in endosperm of all normal maize. The bodies, ranging from 1.4 to 1.8 micron in average diameter in normal corn, were absent at the light microscope level only in the high-lysine mutants, *floury-2* and *opaque-2*; small protein granules, about 0.1 micron in diameter, were found by electron microscopy in *opaque-2* but not in *floury-2*. Demonstration of subcellular, alcohol-soluble protein bodies in endosperm cells by light microscopy provides a reliable indication that the protein composition of the variety is normal. Conversely, inability to detect alcohol-soluble protein granules indicates that the protein present is high in lysine.

2511 • A Simple Safety Device for Unattended Laboratory Heating

W. J. DE JARLAIS

J. Chem. Educ. 46(5): 286. May 1969

A device employing a meter relay is used as a fail-safe monitor of a thermocouple in a temperature-

controlled system.

2512* • ARS Culture Collection

C. W. HESSELTINE, W. C. HAYNES, L. J. WICKERHAM, and J. J. ELLIS

Bull. Microbiol. Inst. Czech. 16(2): 10-12. April 1969

The ARS Culture Collection at the U. S. Department of Agriculture's Northern Regional Research Laboratory, Peoria, Illinois, evolved from the collection of fungi begun by Dr. Charles Thom more than 60 years ago and from the microbial collection of the former USDA Bureau of Chemistry and Soils. In 25 years of operation, the ARS Collection has developed policies regarding receipt, maintenance,

preservation, and distribution of cultures, especially patent cultures, as well as those of use in agriculture, industry, and education. The availability of a diversity of cultures and of experts familiar with their systematic relationships, their biochemical behavior, and the requirements for culturing and maintaining them has contributed to many significant accomplishments of the Northern Laboratory.

2513 • Chemical Modification of Wheat Gluten with Hydrazine

L. H. KRULL and J. S. WALL

Can. J. Biochem. 47(6): 581-585. June 1969

The side-chain amide groups of wheat gluten were converted to hydrazide groups by reaction with hydrazine in aqueous and anhydrous systems. When the reaction was carried out in aqueous hydrazine, extensive hydrolysis of side-chain, as well as peptide-amide groups occurred. Anhydrous hydrazine, when

used as solvent and reactant, increased the extent of hydrazide formation and also decreased the peptide-amide cleavage. When the hydrazine concentration was lowered by use of dimethyl sulfoxide as solvent, peptide cleavage was minimal and a good yield of side-chain hydrazide was obtained.

- 2514** • **Optical Rotation of Some α -1,4-Linked Glucopyranosides in the System H_2O -DMSO and Solution Conformation of Amylose**
F. R. DINTZIS and R. TOBIN
Biopolymers 7(4): 581-593. April 1969

The specific rotation of starch components, corrected for refractive index variation, exhibits a discontinuity in the region of the water-dimethyl sulfoxide (H_2O -DMSO) system that corresponds to the composition of the complex $2H_2O$ -DMSO. This discontinuity is a property dependent upon the presence of a number of consecutively linked α -1,4 glucose units and, therefore, must reflect a change in symmetry of a segment of polymer chain. The optical rotation of amylose between 26.5 and 92.5° C.

does not change in DMSO and is only slightly lowered in water at the higher temperature. The behavior of amylose in both DMSO and H_2O is like that of a random coil, as indicated by viscosity and sedimentation measurements. These results may be interpreted either as being compatible with models of amylose in solution in which the polymer backbone has helical twist, or as indicating removal of strong interactions between polymer chain segments by a good solvent.

- 2515*** • **Current Sorghum Research**
R. A. ANDERSON and Y. VICTOR WU
Sorghum Newsletter 12: 32-33. 1969

Research on grain sorghum at the Northern Division continues in several areas of concern to sorghum investigators. One involves the milling and processing of grain sorghum. The studies are directed toward the recovery of valuable fractions

and toward evaluation and characterization of these fractions for use in food and industrial applications. Another area of work is the isolation of proteins from sorghum flour and an evaluation of these proteins with respect to composition and properties.

- 2516** • **Transformation of Aflatoxin B_1 by Steroid Hydroxylating Fungi**
R. W. DETROY and C. W. HESSELTINE
Can. J. Microbiol. 15(6): 495-500. June 1969

Numerous organisms were examined to find a fungal system capable of catalyzing aflatoxin transformations. Some fungi, particularly *Dactylium dendroides*, *Absidia repens*, and *Mucor griseocyanus*, transform about 50 to 60% of aflatoxin B_1 in shake cultures to a new fluorescent-blue compound (R_O), with a lower R_f (0.57) than B_1 (0.69) on silica gel thin-layer chromatographic plates (acetone: $CHCl_3$, 20:80). In a separate assay, washed fungal mycelium suspended in 0.02 M PO_4 buffer catalyzed

a 25 to 30% conversion in 20 hours. The new fluorescent compound was separated from the unchanged B_1 by column chromatography on silica gel with washed $CHCl_3$ containing 6% acetone and 0.75% ETOH as solvent. The ultraviolet spectrum had maxima of 325, 261, and 254 m μ . Its infrared spectrum, showing a shift in absorption peaks at 1760 and 1685 cm^{-1} , indicated a change in the functional carbonyls of B_1 ; in addition, a broad band at 3400 cm^{-1} indicated a hydroxylated compound.

- 2517** • **Effect of Alcohol Washing and Autoclaving on Nucleotides of Soybean Meal**
L. C. WANG
J. Agr. Food Chem. 17(2): 335-340. March-April 1969

Nucleotides from mature soybeans were extracted with trichloroacetic acid and separated into five major 260 m μ -absorbing fractions by anion exchange resin or polyethyleneimide-cellulose column chromatography. Two of the major fractions contained a large quantity of nucleotides. Another major fraction was predominately carbohydrates with a small amount of nucleotides. Gel filtration of the carbohydrate-rich fraction separated pigments from nu-

cleotides. Trichloroacetic acid extracts from alcohol-washed or autoclaved meal had more nucleotides than extracts from untreated meal. The nucleotide elution patterns of extracts from treated meals differed from those of extracts of untreated meal. Alcohol washing or autoclaving apparently disrupts pigment-nucleotide complexes, which cleavage permits a more complete extraction of nucleotides from meals so treated.

- 2518 • Lipids of Defatted Soybean Flakes: Extraction and Characterization**
D. H. HONIG, D. J. SESSA, R. L. HOFFMANN, and J. J. RACKIS
Food Technol. 23(6): 95-100. June 1969

Dehulled soybean flakes, defatted with pentane-hexane, were further extracted with various non-polar and polar solvents to remove free and bound lipids with the object of determining sources of flavor in these flakes and their products. The flakes contain 0.16% residual oil as determined by official test methods. They contain about 3% crude lipids extractable with an azeotropic mixture of hexane: ethanol. Phospholipids, including phosphatidic acid, account for about 60% of the crude lipids. Sterols, triglycerides, sugars, and amino acids, together with lesser amounts of the isoflavones, daidzein and genistein and their glucoside derivatives, are also

present. Palmitic acid content of the phospholipids is nearly three times higher than that in typical soybean oil. The higher content of palmitic acid is balanced by decreases in oleic and linoleic acids.

The hexane-ethanol azeotrope and hot 95% ethyl alcohol are effective solvents in removing the more intense flavors of defatted soybean flakes and the extracted flakes are much reduced in flavor. Fractionation of the crude lipids by silicic acid column chromatography is an effective method for concentrating the soybean flavors.

- 2519 • Copolymers of Starch and Polyacrylonitrile: The Soluble Fraction**
GEORGE F. FANTA, GLEN E. BABCOCK, and ROBERT C. BURR
J. Polym. Sci., Pt. A-1, 7(3): 980-982. March 1969

Conversions of acrylonitrile (AN) to ungrafted polyacrylonitrile (PAN) and of AN plus starch to soluble starch-PAN copolymer were calculated for six starch samples from data obtained by density gradient ultracentrifugation of dimethylformamide (DMF)-soluble fractions. The data showed that DMF

extraction of most reaction products removed largely ungrafted PAN; however, there were instances where conversion to DMF-soluble graft copolymer was relatively high. Higher conversions to soluble copolymer were observed when starch granules were disrupted before the grafting reaction.

- 2520 • Natural Glucosinolates (Thioglucosides) in Foods and Feeds**
C. H. VAN ETEN, M. E. DAXENBICHLER, and I. A. WOLFF
J. Agr. Food Chem. 17(3): 483-491. May-June 1969

The chemistry of the glucosinolates is reviewed and also the biological effects from ingestion of plants containing these compounds. Isothiocyanates, nitriles, oxazolidinethiones, and thiocyanate ion are formed from glucosinolates in the various Cruciferae plants that are used for food, condiments, and feed. As normally consumed, these plants apparently have no deleterious effect because of the low concentration of glucosinolates in the edible parts. Higher con-

centrations of glucosinolates in such oilseed meals as rape and crambe limit the amount of the seed meal that can be used in animal feeds. Work at the Northern Division shows that under many conditions of autolysis (endogenous enzyme hydrolysis) of meal from the rapeseed *Brassica napus* and of crambe seed meal, the major glucosinolates form previously unrecognized organic nitriles instead of the 5-vinyl-oxazolidine-2-thiones (goitrins).

2521 • Determination of the $\Delta 15$ Double Bond in Fatty Acids of Hydrogenated Soybean Oil

L. T. BLACK and R. E. BEAL

J. Amer. Oil Chem. Soc. 46(6): 312-314. June 1969

A method was developed to determine the extent of hydrogenation of the $\Delta 15$ double bond that occurs during partial catalytic hydrogenation of soybean oil.

A linear relationship was found to exist between the linolenate content of commonly occurring C₁₈ unhydrogenated oils (containing no tetraene) and the propanal resulting from their ozonization-reduction. The amount of propanal so produced is directly related to the amount of $\Delta 15$ double bond in these oils, as well as in hydrogenated soybean oils.

Soybean oil was treated with ozone in carbon tetrachloride at -20° C. and then reduced with triphenylphosphine. The ozonized-reduced sample

was injected into a gas chromatograph, operated at 170° C. and equipped with a 12 ft. X ¼ in. column of 100/120 mesh porous polymer beads. The propanal peak was identified and its area used as a measure of the fatty acids containing $\Delta 15$ double bonds in unhydrogenated soybean and other oils of known linolenate content. A nearly stoichiometric amount of propanal results from ozonizing, reducing, and chromatographing soybean oil as shown by comparison with a standard mixture of propanal and carbon tetrachloride. The relative standard deviation for the method is $\pm 4.4\%$.

We have also found this method applicable to other oils containing the omega-3 double bond.

2522 • Synthesis of Unsaturated Aldehydes

HENRY RAKOFF

J. Amer. Oil Chem. Soc. 46(6): 277-279. June 1969

Olealdehyde, linolealdehyde, and stearolaldehyde were prepared from the corresponding acid chlorides by reduction with lithium tri-*tert*-butoxyhydroaluminate. Multiple bond location by means of ozonolysis

techniques and determination of configuration of the double bond by spectral techniques indicate that this reaction proceeds without substantial bond migration or *cis,trans* isomerization.

2523 • Reactions of Chlorine with Some Thiocarbonyl Sugar Derivatives

B. S. SHASHA, W. M. DOANE, C. R. RUSSELL, and C. E. RIST

J. Org. Chem. 34(6): 1642-1645. June 1969

Reactions were investigated between chlorine and some thiocarbonyl sugar derivatives. In each the major product(s) was isolated and identified. Both bis(1,2:5,6 - di - *O* - isopropylidene - 3 - *O* - thiocarbonyl - α - \underline{D} - glucofuranose) disulfide (I) and bis[methyl 4,6 - *O* - benzylidene - 2 - (and 3-) *O* - thiocarbonyl - α - \underline{D} - glucopyranoside]disulfide (III) added four chlorine atoms (two chlorine atoms to each carbon-sulfur double bond) to yield corresponding chloromethylsulfenyl chloride derivatives II and IV. 1,2:5,6 - Di - *O* - isopropylidene - 3 - *O* - (methylthio)thiocarbonyl - α - \underline{D} - glucofuranose (V) reacted in a similar fashion to give VI. On further reaction with chlorine, VI lost the methylthio group and gave a dichloromethanesulfenyl chloride derivative (VII). 1,2 - *O* - Isopropylidene - α - \underline{D} - glucofura-

nose 5,6 - thionocarbonate (VIII), methyl 4,6 - *O* - benzylidene - α - \underline{D} - glucopyranoside 2,3 - thionocarbonate (X), and 3 - *O* - ethoxythiocarbonyl - 1,2:5,6 - di - *O* - isopropylidene - α - \underline{D} - glucofuranose (XII) yielded the corresponding carbonates IX, XI, and XIII. Conversion of VIII \rightarrow IX in the presence of H₂¹⁸O established the origin of the carbonyl oxygen atom. A dithiocarbonate derivative (XVII) was obtained from 1,2 - *O* - isopropylidene - 5,6 - dithio- β - \underline{L} - idofuranose 5,6 - trithiocarbonate (XVI). Two major reaction products from methyl 4,6 - *O* - benzylidene - 2 - (and 3-) *O* - [(1-piperidyl)thiocarbonyl] - α - \underline{D} - glucopyranoside (XIV) were identified as the corresponding carbonyl compound XV and the cyclic carbonate XI.

- 2524 • Mycotoxins as a Possible Cause of Fescue Toxicity**
 S. G. YATES, H. L. TOOKEY, J. J. ELLIS, W. H. TALLENT,
 and I. A. WOLFF
 J. Agr. Food Chem. 17(3): 437-442. May-June 1969

Sporadic outbreaks of fescue foot occur in cattle grazing toxic pastures of tall fescue. The clinical signs of fescue foot can be produced by giving cattle extracts of the toxic hay. An alkaloidal fraction containing the major alkaloid festucine, prepared from such an extract, was not toxic to cattle. The sporadic and seasonal occurrence of fescue toxicity suggests a fungal involvement. One mold isolated from toxic fescue, *Fusarium tricinctum*,

produces three toxins: 4-acetamido-4-hydroxy-2-butenic acid- γ -lactone, 8 α -(3-methylbutyryloxy)-4 β ,15-diacetoxyscirp-9-en-3 α -ol, and an unknown. Of 200 fungal isolates from toxic fescue or from nearby pastures (controls), almost all the toxin-producing molds belonged to the genus *Fusarium*. The specific relationship, if any, of *Fusarium* toxins to fescue foot remains to be determined by tests in cattle.

- 2525 • Countercurrent and Counter Double Current Distribution of 2-Methoxyethyl and 2-Chloroethyl Fatty Esters**
 R. O. BUTTERFIELD
 J. Amer. Oil Chem. Soc. 46(6): 320-322. June 1969

2-Methoxyethyl esters of linseed and safflower oils were made by a base-catalyzed transesterification and 2-chloroethyl esters by acid-catalyzed esterification of the free acids. Both esters were distilled in vacuum. Countercurrent distribution (CCD) of the two linseed esters with a hexane-acetonitrile solvent system indicated that partition coefficients for the individual esters are one-half those of the corresponding methyl esters. These lower partition coefficients permit solvent ratios

nearer to one to be used in both CCD and counter double current distribution (CDCD) and they also reduce loading and transferring errors. Selectivity of the system toward number of double bonds and carbon chain length is the same as when methyl esters are used. Conditions were determined for the CDCD preparations of 2-methoxyethyl and 2-chloroethyl linolenate and linoleate from linseed and safflower oils, respectively.

- 2526 • Proteinase of *Jarilla chocola*, a Relative of Papaya**
 H. L. TOOKEY and H. S. GENTRY¹
 (¹USDA Crops Research Div., Beltsville, Md.)
 Phytochemistry 8(6): 989-991. June 1969

Jarilla chocola is a perennial herb which grows wild in northwestern Mexico. Its fruits and starchy roots are offered as food in the native markets. The plant has a milky latex, as does the related papaya (*Carica papaya*), but no proteinase activity has been reported previously from *Jarilla*. Pressed juice from both fruits and tubers of *J. chocola* contain a proteinase resembling papain in that it responds to

sulfhydryl activators. The enzyme has a pH optimum between pH 8.0 and 9.4 and is 50% inactivated by heating 5 minutes at 70° C. Fruit rind (pericarp) is the richest source of enzyme; lesser amounts occur in whole fruit and in tubers. The specific activity of whole fruit juice compares well with commercial papain in digestive action against casein. Weak milk-clotting activity is also present.

- 2527** • **Simplified Preparation of a Diester Plasticizer from Crambe Seed Oil**
H. J. NIESCHLAG, W. H. TALLENT, and I. A. WOLFF
Ind. Eng. Chem., Prod. Res. Develop. 8(2): 216. June 1969

A diester plasticizer was prepared via an improved reaction sequence involving oxidative ozonolysis of the unsaturated glycerides of crambe oil, followed by acid catalyzed alcoholysis with 2-methylpentanol. An 87° yield of 2-methylpentyl esters of dibasic

acids (mainly brassylic and azelaic) resulted after removal of catalyst, glycerol, and monoesters. Previously, this mixture of diesters had proved to be an excellent low-temperature plasticizer for poly-(vinyl chloride).

- 2528*** • **Goitrogens**
CECIL H. VAN ETTEN
In "Toxic Constituents of Plant Foodstuffs," ed. I. E. Liener, chap. 4, pp. 103-142. New York. 1969

This review chapter (184 references) emphasizes recently acquired chemical knowledge of goitrogenic agents and their precursors found in plants. Isothiocyanates, nitriles, oxazolidinethiones, and thiocyanate ion are formed from thioglucosides (glucosinolates) in various Cruciferae plants often used for food, condiment, and feed. As normally consumed, these plants apparently are not harmful because of the low concentration of thioglucosides

in the edible parts. Higher concentrations of the thioglucosides in such oilseeds as rape and crambe limit the amount of the seed meal that can be used in animal feeds. The latest work shows that the kind of goitrogen formed from the thioglucoside depends on the conditions of the thioglucoside hydrolysis. Among plants other than from the Cruciferae family there is evidence for an uncharacterized goitrogen in raw soybeans.

- 2529** • **New Homothallic Taxa of *Hansenula***
LYNFERD J. WICKERHAM
Mycopathol. Mycol. Appl. 37(1): 15-32. February 1969

Four new species and one new variety are described. Three of the species, *H. henricii*, *H. nonfermentans*, and *H. glucozyma*, are primitive haploids that live in association with coniferous trees and bark beetles. All synthesize phosphomannans. *H. dimennae* is a free-living species that lives in the soil, and all

strains studied to date were isolated from soils of the Orient. It is one of the few species that produce Saturn-shaped ascospores. The new variety *subsufficiens* belongs to the species *H. saturnus*, from which it differs by inability to synthesize biotin.

REPUBLICATION

- 378 • **Oriental Methods of Using Soybeans as Food. With Special Attention to Fermented Products and Notes on Oriental Farming Practices**
ALLAN K. SMITH
North. Util. Res. Develop. Div.
U. S. Agr. Res. Serv., ARS-71-17, 65 pp. May 1969 [Processed]

Supply of this bulletin, issued in June 1961, was exhausted. Due to continued demands it has been reprocessed.

CONTRACT AND GRANT RESEARCH PUBLICATIONS

[Report of research work done by an outside agency under contract with the U.S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division.]

- 199-C • **Cytology of Milky Disease Bacteria. I. Morphogenesis of *Bacillus popilliae* in Vivo**
 S. H. BLACK
 Baylor University College of Medicine, Houston, Texas
 J. Invertebr. Pathol. 12(2): 148-157. November 1968

- 200-C • **Cytology of Milky Disease Bacteria. II. Morphogenesis of *Bacillus popilliae* in Vitro**
 S. H. BLACK
 Baylor University College of Medicine, Houston, Texas
 J. Invertebr. Pathol. 12(2): 158-167. November 1968

- 201-C* • **Wheat Flours for Sizing Linerboard**
 GEORGE T. AUSTIN¹ and JOHN E. SULLIVAN²
 ¹Washington State University, Pullman, and ²Boise-Cascade Corp., Wallula, Wash.
 Tappi 51(11): 53A-54A. November 1968

- 202-C* • **New Coatings Based on Drying Oil Aldehydes and Hydroxyl Bearing Resins**
 P. R. SAMPATH and A. E. RHEINECK
 North Dakota State University, Fargo
 J. Paint Technol. 41(528): 17-24. January 1969

- 204-C • **Vinylation of Methyl α -D-Glucopyranoside**
 J. T. MARVEL, J. W. BERRY, R. O. KUEHL, and A. J. DEUTSCHMAN, JR.
 University of Arizona, Tucson
 Carbohyd. Res. 9(3): 295-303. March 1969

- 205-C* • **Amino Acid Composition and Nutritional Value of Milled Sorghum Grain Products**
 F. K. SHOUP, C. W. DEYOE, J. CAMPBELL, and D. B. PARRISH
 Kansas State University, Manhattan
 Cereal Chem. 46(2): 164-171. March 1969

- 208-C* • **A 1:1 Adduct of Methyl- α -D-Glucopyranoside and Potassium Hydrogen Carbonate**
 J. W. BERRY, B. I. MAYALL, J. T. MARVEL, and A. J. DEUTSCHMAN, JR.
 University of Arizona, Tucson
 Carbohyd. Res. 9(1): 122-124. January 1969

- 209-C* • **Homogeneous Catalysis in the Reactions of Olefinic Substances. XI. Homogeneous Catalytic Hydrogenation of Short-Chain Olefins with Dichlorobis-(triphenylphosphine)platinum(II)-Tin(II) Chloride Catalyst**
R. W. ADAMS, G. E. BATLEY, and JOHN C. BAILAR, JR.
University of Illinois, Urbana
J. Amer. Chem. Soc. 90(22): 6051-6056. October 1968
- 210-C • **Structure, Properties, and Cross-linking Reactions of Poly(ester acetals)**
ROBERT W. LENZ
University of Massachusetts, Amherst
Macromolecules 2(2): 129-136. March-April 1969
- 211-C* • **[The Isomerism and Hydrogenation of Polyolefinic Substances. In Japanese]**
J. C. BAILAR, JR., H. ITATANI, and H. TAYIM
University of Illinois, Urbana
J. Jap. Chem. 22: 41-45. 1968
- 212-C* • **Homogeneous Catalytic Hydrogenation and Isomerization of Olefins with Dichlorobis(triphenylphosphine)platinum(II)-Tin(II) Chloride Catalyst**
R. W. ADAMS, G. E. BATLEY, and JOHN C. BAILAR, JR.
University of Illinois, Urbana
Inorg. Nucl. Chem. Lett. 4(8): 455-458. August 1968
- 213-C* • **Palladium(II)-Tin(II) Complexes**
G. E. BATLEY and J. C. BAILAR, JR.
University of Illinois, Urbana
Inorg. Nucl. Chem. Lett. 4(10): 577-580. October 1968

[Report of research work done by an outside agency under a grant from the U.S. Department of Agriculture and supervised by the Northern Utilization Research and Development Division.]

- 34-G* • **Multiple Attack by α -Amylases**
MUKHTAR ABDULLAH, DEXTER FRENCH, and JOHN F. ROBYT
Iowa State University, Ames
Arch. Biochem. Biophys. 114(3): 595-598. June 1966
- 35-G* • **Isolation of Amylolytic Strains of *Thermoactinomyces vulgaris* and Production of Thermophilic Actinomycete Amylases**
M. J. KUO and P. A. HARTMAN
Iowa State University, Ames
J. Bacteriol. 92(3): 723-726. September 1966
- 36-G* • **Purification and Partial Characterization of *Thermoactinomyces vulgaris* Amylases**
M. J. KUO and P. A. HARTMAN
Iowa State University, Ames
Can. J. Microbiol. 13(9): 1157-1163. September 1967

- 37-G* • **Multiple Attack Hypothesis of α -Amylase Action: Action of Porcine Pancreatic, Human Salivary, and *Aspergillus oryzae* α -Amylases**
JOHN F. ROBYT and DEXTER FRENCH
Iowa State University, Ames
Arch. Biochem. Biophys. 122(1): 8-16. October 1967
- 38-G* • **Crystalline Structure in Oriented Fibers of KBr-Amylose**
JOHN J. JACKOBS, ROBERT R. BUMB, and BERT ZASLOW
Arizona State University, Tempe
Biopolymers 6(11): 1659-1670. November 1968
- 39-G • **Methylene-Insertion Reactions with Unsaturated Sugars. Synthesis and Reactivity of 4-C-Cyclopropyl- \underline{D} -xylo-tetrofuranose**
D. HORTON and C. G. TINDALL, JR.
The Ohio State University, Columbus
Carbohydr. Res. 8(3): 328-339. November 1968
- 40-G • **On the Amination of Amylose**
M. L. WOLFROM, K. C. GUPTA, K. K. DE, A. K. CHATTERJEE, T. KINOSHITA, and P. Y. WANG
The Ohio State University, Columbus
Staerke 21(2): 39-43. February 1969
- 41-G* • **Nucleophilic Opening of the Oxetane Rings in 3,5-Anhydro-1,2-*O*-isopropylidene- β - \underline{L} -idofuranose and - α - \underline{D} -xylofuranose**
ROY L. WHISTLER, T. J. LUTTENEGGER, and R. M. ROWELL
Purdue University, Lafayette, Ind.
J. Org. Chem. 33(1): 396-398. January 1968
- 42-G* • **5-Amino-5-deoxy-1,2-*O*-isopropylidene- α - \underline{D} -glucofuranose**
U. G. NAYAK and ROY L. WHISTLER
Purdue University, Lafayette, Ind.
J. Org. Chem. 33(9): 3582-3585. September 1968
- 43-G* • **Dynamic Viscoelastic Characterization of Solid Food Materials**
C. T. MORROW and N. N. MOHSENIN
Pennsylvania State University, University Park
J. Food Sci. 33(6): 646-651. November-December 1968
- 44-G • **Addition Reactions of Methyl 4,6-*O*-Benzylidene-2,3-dideoxy- \underline{D} -erythro-hex-2-enopyranoside**
ESTER L. ALBANO, D. HORTON, and H. H. LAUTERBACH
The Ohio State University, Columbus
Carbohydr. Res. 9(2): 149-161. February 1969
- 45-G* • **Effect of Moisture Content on Mechanical Properties of Shelled Corn**
LEORA SHELEF and NURI N. MOHSENIN
Pennsylvania State University, University Park
Cereal Chem. 46(3): 242-253. May 1969

- 46-G • **The Action of Bromine on Tetra-*O*-acetyl-1-*S*-acetyl-1-thio- β -D-glucopyranose. Formation and Decomposition of Tetra-*O*-acetyl- β -D-glucopyranosylsulfenyl Bromide**
R. H. BELL and D. HORTON
The Ohio State University, Columbus
Carbohyd. Res. 9(2): 187-199. February 1969
- 47-G • **Reactions of Tetra-*O*-acetyl- β -D-glucopyranosylsulfenyl Bromide**
R. H. BELL, D. HORTON, and MARTHA J. MILLER
The Ohio State University, Columbus
Carbohyd. Res. 9(2): 201-214. February 1969
- 48-G* • **Determination of Available Lysine in Proteins**
M. L. KAKADE and IRVIN E. LIENER
University of Minnesota, St. Paul
Anal. Biochem. 27(2): 273-280. February 1969
- 49-G • **Gastrointestinal Gas Following Food Consumption**
F. R. STEGGERDA
University of Illinois, Urbana
Ann. N.Y. Acad. Sci. 150: 57-66. February 26, 1968
- 50-G* • **The Alkaline Hydrolysis of Aromatic Esters of Phosphoric Acid**
E. T. KAISER and K. KUDO
University of Chicago, Chicago, Ill.
J. Amer. Chem. Soc. 89(25): 6725-6728. December 1967

[Report of research work supported with funds provided by the U.S. Department of Agriculture under the Authority of U.S. Public Law 480, 83rd Congress, and sponsored by the Northern Utilization Research and Development Division.]

- 254-F • **Isolation and Characterization of Soybean Cytochrome *c***
CELIA FRIDMAN, HALINA LIS, NATHAN SHARON,
and EPHRAIM KATCHALSKI
The Weizmann Institute of Science, Rehovoth, Israel
Arch. Biochem. Biophys. 126(1): 299-304. July 1968
- 255-F • **Studies on Starch-Degrading Enzymes. Part X. Theories of the Step-Wise Degradation of Linear Polysaccharides; the Influence of the Molecular Weight Distribution of the Substrate on the Apparent Mechanism**
W. BANKS and C. T. GREENWOOD
University of Edinburgh, Edinburgh, Scotland
Staerke 20(10): 315-319. October 1968
- 256-F* • **An Interesting Species of *Piptocephalis***
USHA BAIJAL and B. S. MEHROTRA
University of Allahabad, Allahabad, India
Zentralbl. Bakteri. Parasitenk. Abt. II, 122(2): 181-184. March 1968
- 257-F • **Use of Bacteriolytic Enzymes in Determination of Wall Structure and Their Role in Cell Metabolism**
Jean-Marie Ghuysen
University of Liege, Liege, Belgium
Bacteriol. Rev., Pt. 2, 32(4): 425-464. December 1968

- 258-F** • **Production of Mevalonic Acid by Fermentation**
GAKUZO TAMURA, KUNIO ANDO, KENKIRO KODAMA, and KEI ARIMA
University of Tokyo, Tokyo, Japan
Appl. Microbiol. 16(7): 965-972. July 1968
- 259-F** • **Lipids in *Cruciferae*. IV. Fatty Acid Patterns in Single Seeds and Seed Populations of Various *Cruciferae* and in Different Tissues of *Brassica napus* L.**
LARS-AKE APPELQVIST
Swedish Seed Association, Svalof, Sweden
Hereditas 61(1-2): 9-44. 1969
- 260-F** • **Determination of Carbonyl Groups in Starches by Polarographic Techniques Using *o*-Phenylenediamine. I. Reactions of *o*-Phenylenediamine with Mono- and Disaccharides**
M. TAKAGI, Y. GOTOH, R. HOSOGAKI, S. AMANO, and S. ONO
University of Osaka Prefecture, Sakai, Japan
Staerke 20(7): 215-224. July 1968
- 261-F** • **Intracellular Distribution of Tocopherol in Soybean Cotyledons**
MAMORU KOMODA,¹ SETSURO MATSUSHITA,² and ICHIRO HARADA¹
¹Sugiyama Chemical Research Institute, Mitaka, Tokyo, Japan
²Research Institute for Food Science, Kyoto University, Kyoto, Japan
Cereal Chem. 45(6): 581-588. June 1968
- 262-F** • **Structure and Biosynthesis of the Bacterial Wall Peptidoglycan**
J. M. GHUYSEN
University of Liege, Liege, Belgium
In "Peptides 1968," Proc. 9th Eur. Symp., Paris, France, April 1968, pp. 283-292. 1968
- 263-F** • **Applications of Magnetic Resonance Spectroscopy of the Hydroxyl Protons to the Analysis of Starch-Derived Products**
B. CASU, G. G. GALLO, M. REGGIANI, and A. VIGEVANI
Scientific Institute of Chemistry and Biochemistry, Milan, Italy
Staerke 20(12): 387-391. December 1968
- 264-F** • **Determination of Carbonyl Groups in Starches by Polarographic Techniques Using *o*-Phenylenediamine. II. Effect of Sodium Sulfite on Reactions of Oligosaccharides with *o*-Phenylenediamine**
M. TAKAGI, T. NISHIO, K. DAN-URA, K. TAKAHASHI, and S. ONO
University of Osaka Prefecture, Sakai, Japan
Staerke 20(8): 251-256. August 1968
- 265-F** • **Determination of Carbonyl Groups in Starches by Polarographic Techniques Using *o*-Phenylenediamine. III. Separation of 2-Methylquinoxaline from Reaction Mixtures by Extraction or Chromatographic Techniques**
M. TAKAGI, T. NISHIO, Y. IMAOKA, N. KAMATANI, and S. ONO
University of Osaka Prefecture, Sakai, Japan
Staerke 20(9): 283-288. September 1968

- 266-F • **Antiviral Activity of Mycophenolic Acid. Studies on Antiviral and Antitumor Antibiotics. IV**
KUNIO ANDO,¹ SEIKICHI SUZUKI,² GAKUZO TAMURA,¹ and KEI ARIMA¹
¹University of Tokyo, Tokyo, Japan
²Chugai Pharmaceutical Co., Ltd., Tokyo, Japan
J. Antibiot. 21(11): 649-652. November 1968
- 267-F • **The Characterization of Starch and its Components. Part 1. The Semi-Micro Estimation of Starch and its Components in Aqueous Solution**
G. K. ADKINS, W. BANKS, C. T. GREENWOOD, and A. W. MAC GREGOR
University of Edinburgh, Edinburgh, Scotland
Staerke 21(3): 57-61. March 1969
- 268-F • **A Dimeric Oxidation Product of Γ Tocopherol in Soybean Oil**
MAMORU KOMODA and ICHIRO HARADA
Sugiyama Chemical Research Institute, Tokyo, Japan
J. Amer. Oil Chem. Soc. 46(1): 18-22. January 1969
- 269-F • **Applying Proteolytic Enzymes on Soybean. Part IV. A Ninhydrin-Negative Bitter Peptide in Peptic Hydrolyzate of Soybean Protein**
MICHIKO YAMASHITA, SOICHI ARAI, and MASAO FUJIMAKI
The University of Tokyo, Tokyo, Japan
Agr. Biol. Chem. (Tokyo) 33(3): 321-330. March 1969
- 270-F • **Colorimetric Estimation of Triphenylmethyl Group in Carbohydrate Polymers**
H. C. SRIVASTAVA, K. V. RAMALINGAM, and S. CHAKRABARTI
Ahmedabad Textile Industry's Research Association, Ahmedabad, India
Indian J. Chem. 7(1): 98-99. January 1969

January - June 1969

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PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased (50 cents each) from the Commissioner of Patents, U.S. Patent Office, Washington, D.C. 20231. Order by number, do not send stamps.]

Dichloride Salts of *O*-Methylenated Sugar Acids

WILLIAM A. P. BLACK, ERIC T. DEWAR, and DAVID RUTHERFORD
U.S. Patent 3,420,852. January 7, 1969

Dichloride salts of novel *O*-methylene derivatives of gluconic acid or idaric acid are interfacially polymerized with diamines or novel substituted diamino dideoxy sugar alcohols to provide improved

linear polyamides, fibers of which exhibit improved resistance to yellowing. Novel water-soluble polyvinyl ethers that contain hexitol residues are also disclosed.

Salt-Resistant Thickeners Comprising Base-Saponified Starch-Polyacrylonitrile Graft Copolymers

LEWIS A. GUGLIEMELLI, MARY OLLIDENE WEAVER, and CHARLES R. RUSSELL
U.S. Patent 3,425,971. February 4, 1969

Two percent dispersions of saponified starch-polyacrylonitrile graft copolymers provide viscosities of about 6,000 c.p.s. even though dispersed in a 12% brine. The presence of only a limited

sensitivity to high salt concentrations provides the saponified graft copolymers with great potential as a bodying agent for use in secondary oil recovery operations from off-shore wells.

Shortened Fermentation Process for Obtaining D-Mannitol

KARL L. SMILEY, MARTIN C. CADMUS, and SEYMOUR PETER ROGOVIN
U.S. Patent 3,427,224. February 11, 1969

D-Mannitol is obtained from glucose in nearly 50% yields in only 8 to 13 days by highly aerated submerged fermentations of either *Aspergillus candidus* NRRL 305 or NRRL 3248 if the glucose content of the

medium is periodically replenished prior to virtual exhaustion, thus preventing the mold from materially metabolizing the very mannitol it has produced.

Microbiological Decontamination of Aflatoxin-Contaminated Edibles

ALEX CIEGLER and EIVIND B. LILLEHOJ
U.S. Patent 3,428,458. February 18, 1969

Aflatoxin contaminated food or feedstuffs could be detoxified by the addition of *Flavobacterium aurantiacum* NRRL B-184..

Method of Precipitating Polyvalent Cations

WILLIAM A. P. BLACK, ERIC T. DEWAR, and DAVID RUTHERFORD

U.S. Patent 3,433,738. March 18, 1969

Aqueous solutions of the sodium salt of poly(3-0-methacryloyl-D-gluconic acid) exhibit high viscosities and effectively precipitate polyvalent cations

from solution. The preparation of the above polyacid via a subsequently deacetonated isopropylidene intermediate is described.

Process for Preparing Rigid Polyurethane Foams of Open Cell Structure

BONNIE L. ZAGOREN, FELIX H. OTEY, and CHARLES L. MEHLTRETTER

U.S. Patent 3,433,752. March 18, 1969

The inclusion of an alkali metal salt of an α -sulfonated higher fatty acid in a one-shot rigid polyether polyurethane formulation also containing a conventional closed-cell surfactant provides a rigid foam

in which from about 75% to about 99% of the cells now exhibit unexpected intercommunicating pores or capillaries, thus making these cells of the open type.

Starch Polyethyleniminothiourethane Additives for Paper

GEORGE G. MAHER

U.S. Patent 3,436,305. April 1, 1969

Paper exhibiting markedly improved strength properties is produced by adding to a cellulosic pulp 2.5 to 10% based on the dry pulp weight of a starch thiourethane, produced by reacting lowly substituted starch xanthate with about 3.5 stoichiometric equivalents

of 3,000 to 100,000 molecular weight polyethylenimine, and then adjusting the pH with acid to precipitate the starch thiourethane upon the cellulosic fibers.

Reinforced Rubber by Coprecipitation with Starch Xanthate or Pregelatinized Starch

RUSSELL A. BUCHANAN, CHARLES R. RUSSELL, and ORVILLE E. WEISLOGEL

U.S. Patent 3,442,832. May 6, 1969

White high tear and tensile strength rubber is prepared from natural or synthetic latices by adding major amounts of gelatinized starch or starch xanthate and coprecipitating, with high efficiency, readily filterable curds by adding salts, drying, milling with pigment and additives, and vulcanizing.

The unexpected properties are attributed to phase reversal resulting in continuous rubber phase. The process is also well adapted to incorporation of lignin as a filler by coprecipitation from aqueous phase.

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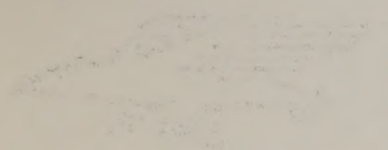
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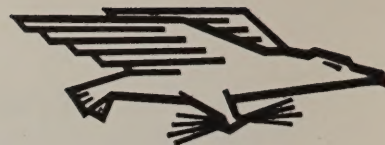
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